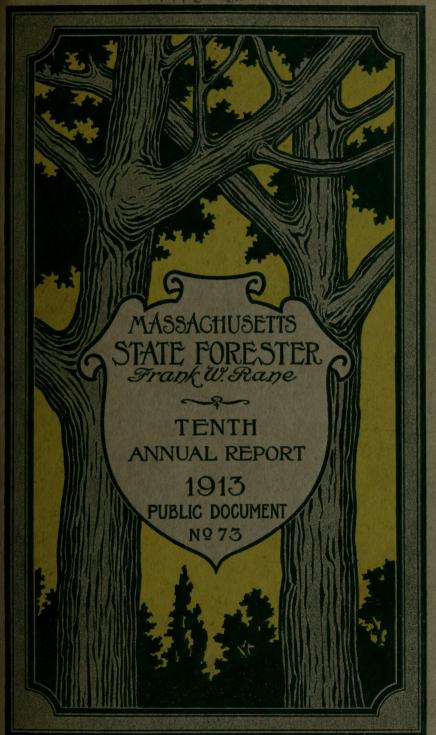
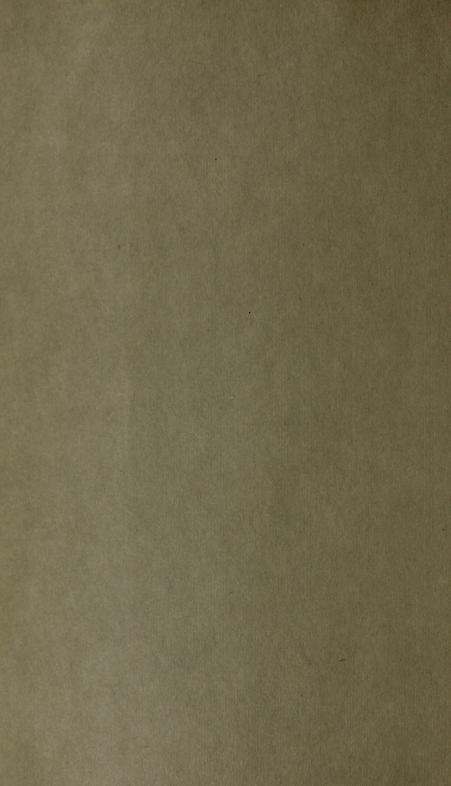


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THE

STATE FORESTER

OF

5669

MASSACHUSETTS.

TENTH ANNUAL REPORT,

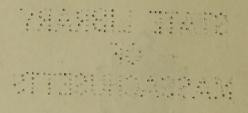
F. W. RANE, STATE FORESTER.



BOSTON:

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APPROVED BY
THE STATE BOARD OF PUBLICATION.



634,400 M3 579 R 1913-19

The Commonwealth of Massachusetts.

To the General Court.

I herewith am pleased to present this the tenth annual report of the State Forester, which designates the activities of the department throughout the year, together with recommendations for the future.

The gypsy and brown-tail moth work, which this department has been able to reduce \$115,000 a year, compared with 1911, has amalgamated nicely into the State Forester's department and is herein reported upon. The present general outlook for this work is more promising than ever.

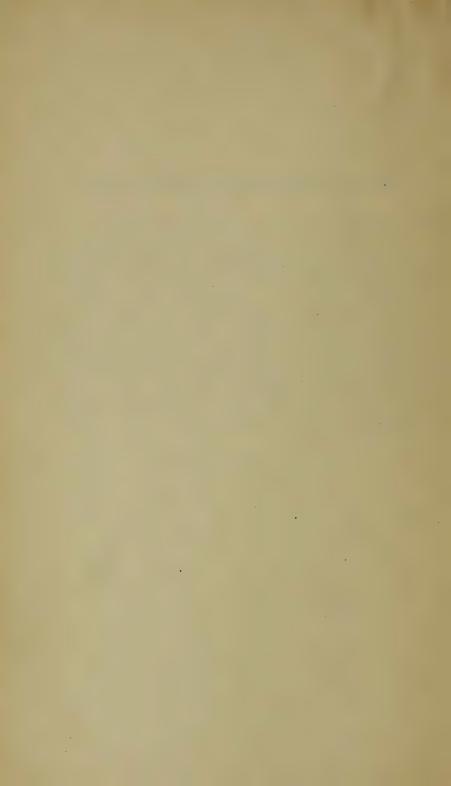
This report is submitted in accordance with the provisions of chapter 409, section 5, Acts of 1904.

Respectfully submitted,

F. W. RANE,

State Forester.

DEC. 20, 1913.



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The town of Winchendon forest fire auto truck. Has carried ten men and necessary equipment. It is also used as an auxiliary hose truck for house fires. By an ingenious arrangement the hose-reel and box containing hand extinguishers are quickly interchangeable, and hence the truck serves a double purpose. Cost of truck, \$1,000.



A four-year plantation of Scotch pine, planted by the Murdock Company of Winchendon. The whole farm was purchased for the value of its wood growth, and the run-out fields, as here shown, have been planted. This farm is located in Ashburnham. A good example of what the Winchendon manufacturers are doing They also plant cut-over lands in the same way.

The Commonwealth of Massachusetts.

TENTH ANNUAL REPORT OF THE STATE FORESTER.

INTRODUCTION.

With this report the office of State Forester completes the first decade of its existence. It is a pleasure at this time not only to report upon the activities and accomplishments of the year just closing, but to also call brief attention to our ten years of sturdy growth and our increasing usefulness to this grand old Bay State, whose natural resources we are striving to protect and augment. The people of Massachusetts are second to none in public sentiment, and now that forestry is definitely recognized as of fundamental importance to both our economic and æsthetic development, in what direction, may I ask, should our efforts toward usefulness tend during the next ten years?

Let us all have a hand in this most promising and captivating work, and I am sure that future decades as they roll by will each point to the earnest beginning of this generation.

If our interest in the work maintains its steady growth throughout the State, the next ten years will accomplish far more than most people realize, and hence even we, ourselves, may live to enjoy some of the first fruits of our labors.

It is proverbial that we Americans are rather deliberate and desire to get our bearings before we really set ourselves to a task, but once satisfied we are right, then we break all precedent in our ability to accomplish results. What Germany, Austria, France, Denmark, Belgium and other countries have taken centuries to learn, we can quickly adopt and put into practice. To allow 1,000,000 acres of depleted and waste lands to lie idle in a live and progressive State like Massachusetts, where the

markets are the best in the world, is accounted for only by the fact that forest products, like all other natural resources, have been cheap in the immediate past, it being necessary only to harvest the crop. From now on we shall find it necessary to plant and grow the crop to secure us a harvest.

Besides the 1,000,000 acres of so-called waste land capable of reforestation, it is estimated that there are 2,000,000 more in forests of varying conditions, one-half of which, it is safe to say, comprising sprout or scrub growth of little financial value, while the remainder is in merchantable condition.

This office has made sufficient study of the growth of white pine alone to show that, at present prices even, we might in the future, under modern forestry practices, cut lumber annually that would yield millions of dollars to this Commonwealth.

Most of our people think that Massachusetts is so depleted and cut over from a forestry standpoint that we are in a very humiliating position, and they are right; and yet our scattered remnants of forests continue to supply trees enough to keep 300 saw mills, mostly of the portable type, busily engaged every day throughout the year in some section of the State. The lumber produced in the State to-day, therefore, is a very great asset, probably approximately 500,000,000 feet, board measure, and representing an annual investment of \$15,000,000 and a net profit of from \$2,500,000 to \$7,500,000 to our people.

It is estimated that we grow only 5 per cent. of the forest products used in the State. Massachusetts is a busy and bustling manufacturing center, and her demands for lumber and other forest products are no small matter. A bulletin the first of its kind to be published in this country — has been issued by the State Forester and contains a list of our various wood-using industries, their location throughout the State, the kinds of forest products used, the finished product and other very interesting information. At the present time we are drawing on Washington and Oregon at almost prohibitive prices for our better soft woods, and from the Carolinas and Tennessee for our hard woods; but may we pause to ask where shall our mill owners turn next, once these virgin sources are depleted. Surely, we must feather our nest now while we can depend upon the outside supply, so that when this begins to ebb we may be able to turn to our own home-grown products.

It costs \$20 or more a thousand to ship lumber from the Pacific Coast to us, and we can plant, grow, harvest and make a profit right here at home for this expenditure.

As State Forester, I desire to see our people enthused on such a broad and comprehensive scale in reforestation and the practice of modern forestry methods as to make this old Bay State a veritable forest park from the tip of Cape Ann to the town of Mount Washington, and from the summit of Greylock Mountain to Provincetown and our islands in the sea. Let the slogan, "Boost forestry!" prevail everywhere.

Our lumbermen without exception are everywhere practicing more economic methods, especially upon the properties owned by them; boards of trade and merchant associations are recognizing the importance of better forestry as a great future asset to their respective sections, while clubs and other organizations are surely no less interested.

The Massachusetts State Forestry Association, which has a permanent paid secretary who gives his whole time to the work of the association, has found more real interest in forests and trees on the part of our people generally throughout the past year than has been shown heretofore. The membership alone, which is entirely voluntary, is indicative of the present interest, having increased from 1,800 to 3,200. The membership was only 800 three years ago. It is needless to point out that this association has been and is of valued assistance to the State Forester; in fact, it was this organization that labored so diligently for forestry in the decades before this office was created.

The State Board of Agriculture, backed by its strong constituency of agricultural societies, which represent the rural industries of most of our stalwart farming sections, is also showing splendid interest in forestry.

The Massachusetts State Grange, our own order of Patrons of Husbandry, which is recognized in every rural community in Massachusetts as life-giving and comprising a social center, has been of great help to this department as a medium for getting into personal touch with landowners interested in our work. It was the enthusiastic support of the State Grange, I am frank to say, that aided as much as any one factor in the enactment of our present and most efficient forest fire permit law.

The Federation of Woman's Clubs, it is needless to point out, has ever been in the front rank in promoting better forestry.

So I might continue to elaborate upon the good will and assistance of organizations and associations which are aiding the State Forester in his work; but suffice it to say that we appreciate their co-operation and trust in its continuance. We feel sure of this continued co-operation, since our cause is so worthy and so dear to the hearts of all of us.

ACTIVITIES OF THE DEPARTMENT.

The work that was so fully outlined in the introduction of last year's report I refrain from again reviewing here. While we thought our activities were many and effective at that time we are frank to confess that during the past twelve months the work has increased, both in new directions and in the enlargement of old methods. The number of observation or look-out stations for forest fires was increased from 18 to 21, and the State Fire Warden's work strengthened in every way. The inspection of railroad locomotives has been conducted for the first time by our own men, which co-operation has resulted in far better service, in improved spark arresters and ash pans.

The chestnut blight work was greatly augmented by our being able, through the continued co-operation with the United States Department of Agriculture, to secure the services of Mr. Roy G. Pierce, a graduate in forestry who had been in the employ of the Pennsylvania Chestnut Blight Commission until that work was discontinued. Mr. Pierce has entered heartily into the State Forester's plans, and it is believed that our activities have been recognized in every section where the chestnut grows. A report on chestnut blight published elsewhere will be of interest.

The activities in the moth work have been fully as encouraging as any phase of the State Forester's undertakings. Notwithstanding the fact that we are spending \$115,000 less than we were two years ago, the work has gone on with equal efficiency. We have studied carefully the conditions of each city and town, and our efforts, due to more experience on the part of both State and local officials, have resulted in far greater efficiency and economy.

The introduction of sylvicultural methods and better forestry practices has made the outlook in moth suppression more encouraging than at any previous time. Step by step, each year seems to give us a new vantage point in the moth work, and while it is conceded by all experts that our problem is now one of suppression and not extermination, we in this State are prepared to handle the problem in the most rational and economic way. The moth work in our cities and towns is resolving itself down to a definite business undertaking in which each is lessening its expenditures in proportion to the thoroughness with which the work is done each year. Towns and cities alive and active are beginning already to look with relatively little concern on the problem, especially throughout their residential sections. Woodlands are also being properly managed by this department as regards the gypsy and brown-tail moths, and with a greater degree of success than ever.

During the stripping stage of the gypsy moth this year we notified all the division superintendents to list all forest properties within their respective territories thus affected, and to report the names of the owners, the location of the tracts and the number of acres stripped. Upon receipt of these data a notice was sent each landowner in which the services of a trained forester were offered, at no expense, to meet the said owner and advise him, on the ground, as to the best methods of management to pursue. The only condition on the part of the owner was that he sign and return the request and plan to carry out the meeting. This work is the continuation of that alluded to under the heading, "Better Forestry the Solution of the Moth Problem," in last year's report.

The scheme has worked out marvelously, and over 300 requests have been received for examinations and advice, and they are still coming in. Mr. Paul Kneeland, who succeeded Mr. H. F. Gould, the latter resigning to go into private forestry work, has organized and carried out this work with the aid of Mr. Smith and certain of the division superintendents, until at the present time he has examined 10,000 acres. Already forestry operations have resulted in actually carrying out the work on 1,000 acres. At the present time, organized operations in improvement cuttings are being practiced in 12 different

places. The results of this work, together with more detailed information as to cost, etc., will be given elsewhere in this report.

The parasite work has already begun to show very good results, as must be evidenced by all casual observers. Particularly is this true in the case of the imported calosoma beetle which, in both the adult or beetle and the larval stages, was extremely numerous this past year. In neglected woodlands, where the moths were bad, the writer is of the opinion that the calosoma destroyed at least one-tenth of the moths present. Other parasites are reported upon elsewhere by Dr. L. O. Howard, United States Entomologist, who has co-operated with us.

Of the mechanical methods of suppression, spraying with arsenate of lead is still one of the great factors in our hands for ameliorating conditions. Several more towns have added high-power spraying machines during the year.

Approximately 750 tons of arsenate of lead were used throughout the season. The Metropolitan Water and Sewerage Board purchased an auto truck sprayer the past season, which makes the third now in use.

The plans for enlarging the output from our nurseries, through utilizing the labor of some of our State penal institutions, are very promising indeed. Three acres of transplant stock were set out on land turned over to the State Forester for this purpose on the land of the State Farm at Bridgewater this fall, and Captain Blackstone, the superintendent of the institution, has promised us enough more land to make 10 acres in all by next spring.

The Foxborough State Hospital is also preparing a plot for a nursery on a very conspicuous site along the State highway at Norfolk, and it is believed this institution, through its being able to co-operate in aiding the State in the work of reforestation, can render splendid service to the State. Dr. Neff, the superintendent, and the board of trustees are all very enthusiastic over the undertaking. The State Forester's nursery at Amherst is as great a success as ever, and our total capacity is estimated at about 7,000,000 seedlings and transplants at the present time. We have donated several hundred

thousand to various State institutions, as the nursery report will show. This is printed elsewhere in the report.

The last General Court created, and Governor Foss appointed, a commission on the taxation of waste and forest lands. This commission has been arduously at work holding hearings throughout the State and making a study of the subject during the summer and fall. These deliberations will be incorporated into a bill to be submitted to the incoming Legislature for its approval. I am sure we all will welcome a more wholesome and definitely regulated system of taxation, to encourage the practice of modern forestry in the State.

Our present method of leaving slash after lumbering operations continues to be one of our greatest menaces, and results in constant loss and damages to forest property owners. In talking with some of our best lumbermen it is generally agreed that if we were to require that the slash be disposed of, it would do more for future forestry possibilities in the State than any other one thing. Our really great forest-fire losses are inevitably caused, not by the average fire that is found in the woods, but from the fact that these fires occasionally reach large bodies of slash where they get the momentum that becomes uncontrollable. The time is bound to come when this slash menace must be regulated. Why not give it due consideration at the present time?

It is believed that the time is ripe for the State to enlarge upon its forest policy to the extent of establishing State forests. The work under our reforestation act has been a pronounced success and very useful as a beginning, but we need a much more pretentious undertaking to do justice to the needs of the State. Massachusetts surely can afford as extensive a policy as many other States are practicing. With our present outlook in utilizing the State institutions for growing our small trees cheaply, we could reforest and manage large tracts of present worthless or waste lands in a practical and economic way. I would respectfully urge the incoming Legislature to give this subject due consideration.

ORGANIZATION.

It has been my purpose to have the organization of the State Forester's department composed of loyal, wide awake, enthusiastic, experienced men.

A clear-cut organization, in which each official not only has a definite field of usefulness but is alert and full of enthusiastic interest, is absolutely necessary to success at our present stage of forestry development. We now have a corps of men familiar with tree and forest conditions throughout the State. The various divisions of the department are in charge of trained men; foresters for the most part, but a few so-called practical men, have been developed, there being no trained foresters of experience and efficiency available. The State policy is to utilize the whole organization in the bettering of our forestry conditions, and while each employee has his definite routine of duty to perform, he at the same time intuitively assists in the control of all forest depredations, such as fires, insects and diseases. While our men are not all experts in entomology or mycology, nevertheless they are familiar with the fundamentals in these sciences, and expert enough to observe new and extraordinary conditions. Where experts are needed they are delegated to direct the task, but they in turn utilize the State Forester's general organization as auxiliary in the work.

The splendid organization of forest wardens and moth superintendents, one in each town and city, forms an army of publicspirited men who become more efficient each year, and therefore of greater value to the community. There are 353 forest wardens, with over 1,000 deputies, and 282 moth superintendents throughout the State.

There were a few changes in the staff of assistants the past year, as is inevitable each year.

Mr. H. F. Gould, who had been an assistant for several years in forestry management, resigned to engage in forestry work as general manager of the Franklin Forestry Company. It was with reluctance that we parted with his services, as his work was certainly appreciated and of a high order. Mr. Gould had been placed in charge of the work of forestry management as applied to moth control, and he very kindly remained with us several weeks after the term of his resignation, in order that

his successor, Mr. Paul D. Kneeland, could get the work sufficiently in hand. This was highly appreciated by the State Forester.

Mr. Paul D. Kneeland, who succeeded Mr. Gould, is a graduate of the Harvard Forestry School, and has had experience in the United States Forest Service in the west, and has been in the employ of Fisher, Bryant & Olmstead of Boston, foresters.

Miss Charlotte Jacobs, who was the State Forester's only assistant and stenographer when he first came to his present position in the State, resigned last spring after seven years' faithful service. Her regularity, thoroughness and enthusiastic interest in the work of the department are missed.

The office of inspector in the moth work has been discontinued, this going into effect on August 1 last. The office of local moth superintendent has so increased in efficiency that it was found unnecessary to incur this extra expense longer.

The remainder of the organization remains practically intact, the work being shifted more or less to suit our greatest needs.

The organization at present is as follows: -

F. W. RANE, B.Agr., M.S.,

GENERAL STAFF.

. State Forester.

Н. О. Соок, М.Г.,	Assistant Forester.
M. C. HUTCHINS,	State Fire Warden.
GEORGE A. SMITH,	Assistant, moth work.
R. S. LANGDELL,	Assistant, reforestation.
PAUL D. KNEELAND, M.F.,	Assistant moth work.
W. D. CLARK, M.F.,	Assistant, Massachusetts Agricultural College.
ROY G. PIERCE, M.F.,	Assistant, chestnut blight work.
FRANK L. HAYNES, B.F., .	Assistant, forestry management.
JOHN MURDOCH, Jr., M.F., .	Assistant, moth work.
CHARLES O. BAILEY,	Secretary.
ELIZABETH HUBBARD, .	Bookkeeper.
ELIZABETH T. HARRAGHY, .	Stenographer.
JOSEPHA L. GALLAGHER, .	Clerk.
FRANK GARBARINO,	Office boy.

STAFF, FOREST FIRE PREVENTION.

F. W. RANE,	. State Forester.	
MAXWELL C. HUTCHINS,	. State Fire Warden.	
MINER E. FENN, .	. Assistant.	
JAMES E. MOLOY, .	. Locomotive inspector.	
OSCAR L. NOYES, .	. District Forest Warden No. 1	١.
J. J. SHEPHERD,	. District Forest Warden No. 2	2.
JOHN P. CROWE, .	. District Forest Warden No. 3	3.
ALBERT R. ORDWAY	District Forest Warden No. 4	1

Observers and Observation Stations

	Obser	vers	and	Observation Stations.
District 1: —				
WM. BRAY, .				Bald Pate Hill, Georgetown.
M. L. CARPENTER,				Moose Hill, Sharon.
HENRY FAY, .				Hart Hill, Wakefield.
J. FRANK HAMMOND,				Robbins Hill, Chelmsford.
ELLIOT C. HARRINGTO	N,			Blue Hill, Milton.
CAPLIS McCormick,				Morse Hill, Essex.
District 2: —				
CALVIN BENSON,				Shoot Flying Hill, Barnstable.
FRANK L. BUCKINGHA				Reservoir Hill, Plymouth.
WALTER L. EAMES,				Richmond Hill, Dighton.
S. Matthews, .				Middleborough.
Cushing O. Thomas,				Bonney Hill, North Hanson.
District 3:				
A. M. BENNETT,				Lincoln Mountain, Pelham.
		•	•	
W. J. HALLORAN,		•	•	Fay Mountain, Westborough.
		•		Grace Mountain, Warwick.
JAMES MALEY, .				Wachusett Mountain, Princeton.
HAROLD McKINSTRY,				Little Muggett Hill, Charlton.
George W. Sherman	,			Steerage Rock Mountain, Brimfield.
District 4: —				
CLAUDE E. G. CAIN,				Tower Mountain, Savoy.
JAMES S. ROSE, .				Becket Mountain, Becket.
GEO. C. MILLER.				Mount Tom, Easthampton,
NELSON C. WOODWAR		•	٠	-
TVELSON C. WOODWAR	D,	•	٠	Massaemet Mountain, Shelburne.
		Sm	A 10710	Mour Work

STAFF, MOTH WORK.

F. W. RANE, . State Forester. GEORGE A. SMITH, Assistant. PAUL D. KNEELAND, Assistant, forestry moth work. JOHN MURDOCH, Jr., Assistant, forestry moth work. FRANCIS V. LEAROYD, in charge of supply store, FREDERICK P. HALPIN and CLAUDE E. TOWLE, Mechanics. JOHN F. LANERGAN, Assistant at supply store. JOHN W. ENWRIGHT, District 1, 299 Fellsway, Medford. SAUL PHILLIPS, District 2, Box 266, Beverly. JOHN J. FITZGERALD, District 3, 50 Howard Street, Haverhill. WILLIAM A. HATCH, District 4, Lakeside Ave., Marlborough. HARRY B. RAMSEY, District 5, 27 Duxbury Road, Worcester. CLARENCE W. PARKHURST, District 6, Box 472, Medfield. WALTER F. HOLMES, District 7, 181 Allen Street, E. Braintree. JOHN A. FARLEY, District 8, Plymouth, R. F. D.

CO-OPERATIVE SCIENTIFIC STAFF.

CO-OPERATIVE SCIENTIF.	C STAFF.
L. O. HOWARD, Ph.D., Chief, Bure	au of Entomology, United States
Departme	nt of Agriculture, Washington,
D. C., pa	rasites and predaceous insects.
THEOBALD SMITH, Ph.B., M.D., . Professor of	Comparative Pathology, Harvard
Universit	y, diseases of insects.
ROLAND THAXTER, Ph.D., Professor o	f Cryptogamic Botany, Harvard
Universit	y, fungous diseases affecting in-
sects.	
W. M. WHEELER, Ph.D., Professor of	Entomology, Harvard University,

experimental entomologist.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.

[Alphabetically by towns and cities.]

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
57-W, Rockland, .	Arthur B. Reed,	Abington,	C. F. Shaw,	8
10-4,	W. H. Kingsley,	Acton,	J. O'Neil,	5
2003-М,	Henry F. Taber,	Acushnet,	A. P. R. Gilmore,	9
2-0, Kippers, .	John Clancy,	Adams,	John Clancy, .	16
3165-11,	E. M. Hitchcock,	Agawam,		-
151-32, Great Bar-	J. H. Wilcox, State Line,	Alford,		-
rington. 274-M,	James E. Feltham,	Amesbury,	A. L. Stover,	3
174-Y,	A. F. Bardwell,	Amherst,	W. H. Smith, .	6
212,	John H. Baker,	Andover,	J. H. Playdon, .	4
35 or 206,	Walter H. Pierce,	Arlington,	W. H. Bradley, .	1
2-12,	J. T. Withington,	Ashburnham, .	Chas. H. Pratt, .	5
8014,	Wm. S. Green,	Ashby,	Fred C. Allen, .	5
4-12,	Chas. A. Hall,	Ashfield,		-
479-W,	Horace H. Piper,	Ashland,	M. Geoghan, .	7
48-J or 72-4, .	Frank P. Hall,	Athol,	W. S. Penniman, .	6
34-4,	Hiram R. Packard, .	Attleborough, .	W. E. S. Smith, .	7
5-17,	J. F. Searle,	Auburn,	J. F. Searle,	6
3259-М,	J. W. McCarty,	Avon,	W. W. Beals, .	8
96-4 or 47-4, .	Chas. E. Perrin,	Ayer,	D. C. Smith,	5
144-2,	Henry C. Bacon, Hyannis,	Barnstable, .	H. C. Bodfish, .	9
83-4,	A. E. Traver,	Barre,	G. R. Simonds, .	6
11-4,	P. B. McCormick,	Becket,		-
No telephone, .	Chas. E. Williams,	Bedford,	W. A. Cutler, .	1
10,	Jas. A. Peeso,	Belchertown, .	E. C. Howard, .	6
8157-22, Milford,	L. Francis Thayer,	Bellingham, .	H. A. Whitney, .	7
409-W,	John F. Leonard,	Belmont,	C. H. Houlahan, .	1
1367-М,	G. H. Babbitt, Taunton,	Berkley,	J. M. Alexander, .	7
14-6,	R. F. D. Walter Cole,	Berlin,	E. C. Ross,	5
2-13,	Edson W. Hale,	Bernardston, .	Edwin B. Hale, .	6
319-2,	Robert H. Grant,	Beverly,	J. B. Brown, .	2
22-2,	E. N. Bartlett,	Billerica,	W. H. O'Brien, .	4
875-L-1, Woon-	Thomas Reilly,	Blackstone, .	A. J. Gibbons, .	5
socket. 12-2,	I. E. Whitney,	Blandford,		-
9-14,	E. Eliot Hurlbut,	Bolton,	C. E. Mace, .	5
		Boston,	D. H. Sullivan, .	1
	Emory A. Ellis, Bourne-	Bourne,	Edward D. Nick-	9
No telephone, .	dale. H. J. Livermore,	Boxborough, .	erson, C. E. Sherry,	5

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

				_
Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
42-21, George-	Harry L. Cole, George-	Boxford,	C. Perley,	3
town. 4-4,	Harry L. Cole, Georgetown, R. F. D. John N. Flagg,	Boylston,	R. B. Smith,	6
No telephone, .	Jas. M. Cutting, South	Braintree,	Clarence R. Bes-	8
No telephone, .	Braintree. T. B. Tubman,	Brewster,	Russell D. Eaton,	9
8-6,	Edwin S. Rhoades,	Bridgewater, .	A. W. MacFarland,	8
14-3,	Geo. E. Hitchcock,	Brimfield,	G. E. Hitchcock, .	6
1041 or 2020, .	Harry L. Marston,	Brockton,	E. P. Neafsey, .	8
101-13,	Elbert L. Bemis,	Brookfield, .	J. H. Conant, .	6
376,	Geo. H. Johnson,	Brookline,	Ernest B. Dane, .	1
Lampson & Good- now Mfg. Co.	Wm. Sauer, Shelburne Falls.	Buckland,		-
2-2,	W. W. Skelton,	Burlington, .	W. W. Skelton, .	1
51-4,	Robert C. Hughes,	Canton,	A. Hemenway, .	8
		Cambridge, .	J. F. Donnelly, .	1
76-5, Concord, .	Geo. G. Wilkins,	Carlisle,	G. G. Wilkins, .	1
16-2,	Herbert F. Atwood, .	Carver,	H. F. Atwood, .	9
10,	Edwin C. Vincent,	Charlemont, .		~
32-22,	Chas. S. McKinstry,	Charlton,	J. D. Fellows, .	6
28-3,	Geo. W. Ryder, West	Chatham,	Meroyn R. Martin,	9
1597-4, Lowell, .	Chatham. Arnold C. Perham,	Chelmsford, .	M. A. Bean,	4
		Chelsea,	J. A. O'Brien, .	1
167-3,	Chas. D. Cummings, .	Cheshire,		-
33-2,	Myron E. Turner,	Chester,		-
8004,	Chas. A. Bisbee, Bisbees,	Chesterfield, .		-
149-11 or 149-W, .	John E. Pomphret,	Chicopee,	Z. Pilland,	6
No telephone, .	Ernest C. Mayhew, .	Chilmark,	A. S. Tilton, .	9
No telephone, .	Danforth Blanchard,	Clarksburg, .	Geo. Tisdale, .	6
551-M,	North Adams, R. F. D. Patrick H. Kelley,	Clinton,	John B. Connery,	5
177-3 or 260, .	Wm. J. Brennock,	Cohasset,	Wm. H. McArthur,	8
13-12,	J. D. Gilchrest, Griswold-	Colrain,		-
75-3,	ville. Frank W. Holden,	Concord,	H. P. Richardson,	5
5-3,	Edgar Jones,	Conway,		-
8001,	Thos. A. Gabb,	Cummington, .		-
57-11,	S. L. Caesar,	Dalton,		-
No telephone, .	Thos. L. Thayer, North	Dana,	T. L. Thayer,	Б
295-W,	Dana. Michael H. Barry,	Danvers,	T. E. Tinsley, .	2
14-3, Westport, .	Ezekiel W. Reed, North	Dartmouth, .	E. M. Munson, .	9
35-R,	Dartmouth. H. J. Harrigan,	Dedham,	J. T. Kennedy, .	7
273-14, Greenfield,	Wm. L. Harris,	Deerfield,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
No telephone, .	Alpheus P. Baker,	Dennis,	H. H. Sears, .	O
29-3,	Ralph Earle,	Dighton,	D. F. Lane,	7
11-4,	Wm. L. Church,	Douglas,	F. J. Libby,	6
373-3,	John Breagy,	Dover,	H. L. MacKenzie,	7
3353-2,	Frank H. Gunther, .	Dracut,	T. F. Carrick, .	4
152-2, Webster, .	F. A. Putnam,	Dudley,	Frank W. Bate-	6
5-11, Tyngsbor-	Archie W. Swallow, .	Dunstable,	W. H. Savill, .	4
ough.	Eden W. Soule,	Duxbury,	H. A. Fish,	9
146-5,	Richard H. Copeland,	E. Bridgewater, .	Frank H. Taylor,	8
8-5,	Box 115, Elmwood. Asher Markham,	E. Longmeadow,		-
24-3,	Adin L. Gill,	Eastham,	N. P. Clark, .	19
2-11,	J. M. Dineen,	Easthampton, .		_
76,	Frederick Hanlon, North	Easton,	R. W. Melendy, .	7
241-2,	Easton. Manuel S. Roberts,	Edgartown, .	John P. Fuller, .	9
165-25,	Frank W. Bradford, Great	Egremont,		-
2-11,	Barrington. Herbert A. Coolbeth, .	Enfield,	C. H. Morse, .	6
No telephone, .	Chas. H. Holmes, Far-	Erving,	Chas. H. Holmes,	6
23-5,	ley. Otis O. Story,	Essex,	O. O. Story,	2
		Everett,	J. Davidson, .	1
675-R or 675-W,	Wm. P. Shaw,	Fairhaven,	G. W. King,	0
822-W,	Wm. Stevenson,	Fall River,	Wm. Stevenson, .	9
136-2,	H. H. Lawrence, Tea-	Falmouth,	W. B. Bosworth, .	9
745 or 148-J, .	ticket. W. W. Colton,	Fitchburg,	W. W. Colton, .	5
Hoosac Tunnel	H. B. Brown, Drury, .	Florida,		-
pay station. 15-5 or 76-3, .	Ernest A. White,	Foxborough, .	F. S. Richardson,	7
352-4 South Fram-	B. P. Winch,	Framingham, .	N. I. Bowditch, .	7
ingham. 66-12,	Edward S. Cook,	Franklin,	J. W. Stobbart, .	7
3-12,	Andrew Hathaway, As-	Freetown,	G. M. Nichols, .	9
191-М,	sonet. Geo. S. Hodgman,	Gardner,	T. W. Danforth, .	6
	Leander B. Smalley, Me-	Gay Head,	J. W. Belain, .	9
31-4,	nemsha. Clinton J. Eaton,	Georgetown, .	C. J. Eaton,	3
4-15, Bernardston,	Lewis C. Munn, Turners	Gill,	A. Tuttle,	6
547-5,	Falls. Sydney F. Haskell, .	Gloucester, .	H. J. Worth, .	2
18-4,	John S. Mollison, Wil-	Goshen,		-
No telephone, .	liamsburg. Rodney E. Bennett, .	Gosnold,		-
8000,	Sumner F. Leonard, .	Grafton,	C. K. Despeau, .	6
55-4,	C. N. Rust,	Granby,	Chas. N. Rust, .	6
4-12,	Harry A. Root,	Granville,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
5-W,	Daniel W. Flynn,	Gt. Barrington,	T. J. Kearin, .	6
439-J,	J. W. Bragg,	Greenfield,	J. W. Bragg,	6
33-24 Enfield, .	Wm. H. Walker, Green- wich Village.	Greenwich,	E. A. Sawtelle, .	6
	Chas. M. Raddin,	Groton,	J. F. Bateman, .	4
2939-X,	Sidney E. Johnson, .	Groveland,	R. B. Larive, .	3
651-33,	Edward P. West,	Hadley,	Edw. P. West, .	6
5-21,	Albion D. Estes,	Halifax,	F. D. Lyons, .	9
128-2,	Fred Berry, Essex, R.	Hamilton,	E. G. Brewer, .	2
	F. D. Edward P. Lyons,	Hampden,		-
17-F-2,	Chas. F. Tucker,	Hancock,		-
8175-12,	Chas. E. Damon, North	Hanover,	L. Russell,	8
8012-6 Bryant-	Hanover. Albert L. Dame, South	Hanson,	A. L. Dame, .	9
ville.	Hanson. Henry J. Breen,	Hardwick,	P. J. Humphrey, .	6
46-3,	Benj. J. Priest,	Harvard,	G. C. Maynard, .	5
Central,	John Condon,	Harwich,	Arthur F. Cahoon,	9
6-3,	John M. Strong, West	Hatfield,	Seth W. Kingsley,	6
4-2 or 4-1,	Hatfield. John B. Gordon,	Haverhill,	M. J. Fitzgerald, .	4
12-13,	Melvin H. White, Charle-	Hawley,		_
5-18,	mont. S. G. Benson,	Heath,		-
21305,	Geo. Cushing,	Hingham,	T. L. Murphy, .	18
	Louis B. Brague,	Hinsdale,		_
No telephone, .	Walter E. Hooker,	Holbrook,	F. T. White,	8
42-4,	Winfred H. Stearns, Jef-	Holden,	W. H. Stearns, .	6
5-21,	ferson. Oliver L. Howlett, South-	Holland,	A. F. Blodgett,	6
1-2;	bridge, R. F. D. W. A. Collins,	Holliston,	Herbert E. Jones,	7
2295-W	C. J. Healey,	Holyoke,		_
283-12,	Walter F. Durgin,	Hopedale,	W. F. Durgin, .	6
Central,	R. I. Frail.	Hopkinton, .	W. A. MacMillan, .	6
6-13,	E. A. Young,	Hubbardston,	E. A. Young,	6
207-М,	Wm. L. Wolcott,	Hudson,	F. P. Hosmer,	5
248-W,	Smith F. Sturges, Aller-	Hull,	J. Knowles,	8
	ton. John J. Kirby,	Huntington,		_
	Pindar F. Bussell,	Ipswich,	J. A. Morey,	3
	Arthur B. Holmes,	Kingston,	R. F. Randall,	9
261-2,	Nathan F. Washburn,	Lakeville,	N. F. Washburn,	9
218-J,	Arthur W. Blood,	Lancaster,	L. R. Griswold,	5
717-5, Pittsfield, .	King D. Keeler,	Lanesborough, .		
362	Dennis E. Carey.	Lawrence.	I. B. Kelly,	4
				_

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

The market of			T 136.1	D:
Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
66-3	Jas. W. Bossidy,	Lee,		_
37-5	B. H. Fogwell,	Leicester.	J. H. Woodhead, .	6
135	O. R. Hutchinson,	Lenox.	T. Francis Mackey,	6
546 or 28	Fred A. Russell,	Leominster.	D. E. Bassett,	5
9-44, Cooleyville,	O. C. Marvel, North Lev-	T	H. W. Field,	6
468	erett. Asor P. Howe,	Tanington		1
284-11.	Jacob Sauter,	Lexington,	A. P. Howe, .	1 16
			Wm. A. Campbell,	
45-W,	J. J. Kelliher,	Lincoln,	J. J. Kelliher, .	5
17-4	A. E. Hopkins,	Littleton,	A. E. Hopkins, .	5
1233-2,	O. C. Pomeroy,	Longmeadow, .		-
201-12,	E. F. Saunders,	Lowell,	J. H. Gordon, .	4
17-13,	Edward E. Chapman, .	Ludlow,		-
20,	Jas. S. Gilchrest,	Lunenburg, .	James S. Gilchrest,	5
1174,	Herbert C. Bayrd,	Lynn,	G. H. McPhetres, .	2
6-3. Lynnfield Center.	Thos. E. Cox, Wakefield, R. F. D. R. W. Noyes,	Lynnfield,	L. H. Twiss, .	1
	R. W. Noyes,	Malden,	W. B. Gould, .	1
319-W,	Peter A. Sheahan,	Manchester, .	R. I. Crocker, .	2
1-3 or 1-2,	Herbert E. King,	Mansfield,	Marvin J. Hills, .	7
226-W,	Wm. H. Stevens,	Marblehead, .	W. H. Stevens, .	2
117-2,	Geo. B. Nye,	Marion,	J. Allenack, .	9
416 or 151-M, .	E. C. Minehan,	Marlborough, .	M. E. Lyons, .	5
43-3,	Wm. G. Ford,	Marshfield,	P. R. Livermore, .	9
19-11, Cotuit, .	Jos. A. Peters,	Mashpee,	W. F. Hammond, .	19
52-4, ,	Chas. W. Ellis,	Mattapoisett, .	Thos. C. Tinkham,	19
138-3,	Geo. H. Gutteridge, .	Maynard,	A. Coughlin, .	5
106-4,	Waldo E. Kingsbury, .	Medfield,	G. L. L. Allen, .	7
53 or 138	Chas. E. Bacon,	Medford	W. J. Gannon	1
No telephone, .	A. Le Barron Treen, West	Medway,	F. Hager,	7
	Medway.	Melrose,	J. J. McCullough,	1
156-6	Frank M. Aldrich,	Mendon,	F. M. Aldrich, .	6
21-3.	Edgar P. Sargent,	Merrimac,	C. R. Ford,	3
229,	Herbert Nichols,	Methuen,	A. H. Wagland,	4
36 or 5,	Chester E. Weston.	Middleborough.	A. D. Nelson, .	15
8003-2,	Thos. H. Fleming, Ban-	Middlefield, .		
No telephone,	eroft. Oscar H. Sheldon,	Middleton	B. T. McGlauflin,	3
65-3,	Elbert M. Crockett,	Milford,	P. F. Fitzgerald, .	6
			E. F. Roach, .	100
5-2.	Harry L. Snelling,	Millbury,		7
	Chas. LaCroix,	Millis,	E. W. Stafford, .	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
322	Nathaniel T. Kidder, .	Milton,	N. T. Kidder,	8
No telephone, .	S. R. Tower,	Monroe,		_
12-22	O. E. Bradway,	Monson,	Robert S. Fay,	6
278-15, Greenfield,	Fred T. Lyman,	Montague,	Dennis F. Shea.	6
164-4,	D. C. Tryon,	Monterey,	Dominis F. Brica, .	_
3-24, Russell, .	Andrew J. Hall,	Montgomery,		
17-21 Conoke	G. W. Patterson,	Mt. Washington,		_
N. Y.		Nahant,	T. Roland,	. 2
	Richard A. Brooks,	Nantucket,	C. C. Macy,	9
31 or 244-2,	Bernard E. Darling,	Natick.	H. S. Hunnewell.	7
195-1,	Howard H. Upham,	Needham,	E. E. Riley,	7
No telephone,	Chas. S. Baker,	New Ashford,	E. E. Riley,	
2280 or 353,	Edward F. Dahill,	New Bedford, .	C. F. Lawton,	9
6-4,	Frank A. Morse,	New Braintree,	E. L. Havens,	6
13-6, Sheffield,	E. M. Stanton, Mill River,	N. Marlborough,	E. E. Havens,	_
Pay Station,	Rawson King,	New Salem.	R. King,	6
173-5, Newbury-	Wm. P. Bailey,	Newbury,	Percy Oliver,	3
port. 380,	Chas. P. Kelley,	Newburyport, .	C. P. Kelly,	3
20 NT C	W. B. Randlett, Newton	Newton,	C. I. Buckman,	1
41 5	Center. Jas. T. Buckley,	Norfolk,	James T. Buckley,	7
90° W 90°		North Adams, .	Franklin B. Locke.	6
821-W,	H. J. Montgomery,			4
17.0	Geo. A. Rea,	North Andover, .	Fred W. Phelan, .	_
00.14	Chas. F. Gehrung,	N. Attleborough,	F. P. Toner,	7
26-14,	Geo. O. Rollins,	N. Brookfield,	S. D. Colburn, .	6
	Henry Upton,	North Reading,	G. E. Eaton,	1
165,	F. E. Chase,	Northampton, .	Christopher Clarke,	6
14-5,	T. P. Haskell,	Northborough, .	T. P. Haskell,	6
71–5,	W. E. Burnap, Whitins-	Northbridge, .	A. F. Whitin,	6
2-3,	Fred W. Doane,	Northfield,	F. W. Doane,	6
29-11,	Geo. H. Storer,	Norton,	G. H. Storer,	7
11-4,	John Whalen,	Norwell,	J. H. Sparrell,	8
55-4,	Frank W. Talbot,	Norwood,	Ebin F. Gray, .	7
119-4,	Frank W. Chase,	Oak Bluffs, .	P. P. Hurley,	9
17-5,	Chas. H. Trowbridge, .	Oakham,	C. H. Trowbridge,	6
67-13,	Frank M. Jennison, .	Orange,	F. M. Jennison,	6
	James Boland,	Orleans,	A. Smith,	9
15,	Durand A. Witter,	Otis,		_
9-5,	Olin D. Vickers,	Oxford,	C. G. Larned, .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
53-12 or 53-3, .	James Summers,	Palmer,	C. H. Keith,	6
00-12 01 00-0, .	Fred L. Durgin,	Paxton,	F. L. Durgin,	6
18-3	M. V. McCarthy,	Peabody,	J. F. Callahan,	1
		Pelham,	J. F. Cananan, .	1
242-4,	Myron N. Allen,		T T Ma-Faulan	9
7-23, Bryantville,	Jos. J. Shepherd,	Pembroke,	J. J. MacFarlan, .	
54-3 or 12-5, .	Geo. G. Tarbell, East Pepperell. Walter H. Pike,	Pepperell, Peru,	J. Tune,	4
13-2,	Geo. P. Marsh,	Petersham, .	David Broderick,	6
176-6, Athol, .	Wm. Cowlbeck, Athol, R.	Phillipston, .	W. H. Cowlbeck, .	6
149 or 964,	F. D. Wm. C. Shepard,	Pittsfield,		-
33-22,	Albert F. Dyer,	Plainfield,		-
283-J, North At-	R. P. Rhodes,	Plainville,	Ralph Snell, .	7
tleborough. 88-W or 197-W,	Herbert Morissey,	Plymouth,	A. A. Raymond, .	9
11-14,	Thos. W. Blanchard,	Plympton,	D. Bricknell, .	9
19-4, Highland, .	A. W. Doubleday, Green-	Prescott,	C. M. Pierce,	6
13-4	A. W. Doubleday, Greenwich Village. Fred W. Bryant,	Princeton,	F. A. Skinner, .	6
17, Special,	Albert W. Fuller,	Provincetown, .	J. M. Burch,	9
601 or 1,	A. L. Litchfield,	Quincy,	A. J. Stewart, .	8
35-4, Randolph, .	R. F. Forrest,	Randolph, .	Chas. Cole.	8
1284-R,	John V. Festing,	Raynham,	G. M. Leach, .	7
518-W,	H. E. McIntire,	Reading,	H. M. Donegan, .	1
11-12,		Rehoboth,	S. W. Robinson, .	7
	Benj. F. Monroe, Attle- borough, R. F. D.	Revere,	G. P. Babson, .	1
8-2,	T. B. Salmon,	Richmond,		_
No telephone,	Daniel E. Hartley, Mat-	Rochester,	Edw. F. Handy, .	. 9
55-4,	tapoisett, R. F. D. John H. Burke,	Rockland,	F. H. Shaw,	8
27-3,	A. J. McFarland,	Rockport,	F. A. Babcock,	2
21-6, Charlemont,	Merritt A. Peck, Zoar,	Rowe,	r. m. Daboout,	_
3-15,	Daniel O'Brien,	7	L. R. Bishop,	3
	L. G. Forbes,	Rowley,	A. H. Brown,	6
279-2, Athol, .	S. S. Shurtleff,	Russell.	II. II. DIOWII, .	_
10.0	i i		H. E. Wheeler.	6
13-3,	Henry Converse,	Rutland,		2
	Class I Day	Salem,	Warren P. Hale, .	3
000 14 777	Chas. I. Dow,	Salisbury,	H. C. Rich,	9
202-14, Winsted, Conn. 52-14, Sagamore, .	Lyman H. Clark, New Boston. John F. Carlton,	Sandisfield,	B. F. Dennison, .	9
115,	Chas. L. Davis,	Saugus,	T. E. Berrett, .	1
3-3,	Herbert H. Fitzroy,	Savoy,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

		Town or City.	Superintendent.	Div. No.
98-2,	Henry T. Cole,	Scituate,	P. S. Brown,	8
399-L-5, Paw-	John L. Baker, Attlebor- ough, R. F. D.	Seekonk,	C. W. Thompson, .	7
tucket. 121-2,	A. Alden Carpenter,	Sharon,	J. J. Geissler, .	7
24-2,	Arthur H. Tuttle,	Sheffield,		-
130-2,	Chas. S. Dole, Shelburne	Shelburne,		-
11-4, Natick, .	Falls. Milo F. Campbell,	Sherborn,	J. P. Dowse, .	7
16-21,	A. A. Adams,	Shirley,	A. A. Adams, .	5
48-3,	Edward A. Logan,	Shrewsbury, .	C. R. Webb, .	16
2-21,	Fred Aldrich,	Shutesbury, .	E. Colfax Johnson,	6
	Wm. F. Griffiths, Swan-	Somerset,	C. Riley,	7
	sea, R. F. D.	Somerville,	A. B. Pritchard, .	1
471-W, Holyoke, .	Louis H. Lamb, South Hadley Falls.	South Hadley, .	Wm. McLeod, .	6
153-2,	Hadley Falls. Dana Howland,	Southampton, .	C. S. Olds,	Б
13, Marlborough,	Harry Burnett,	Southborough, .	H. Burnett, .	Б
11,	Aimee Langevin,	Southbridge, .	A. Langevin,	6
8-2,	Benj. M. Hastings,	Southwick, .		-
77-4, ,	A. F. Howlett,	Spencer,	G. Ramer,	16
20, Indian Or-	T. J. Clifford, Indian	Springfield, .	W. F. Gale,	6
chard. 5-12,	Orchard. Joel T. Wilder,	Sterling,	J. H. Kilburn,	5
Post Office,	Geo. Schneyer, Glendale,	Stockbridge, .	Brown Caldwell,	6
207-R or 127-M,	Louis F. Bruce,	Stoneham,	G. M. Jefts,	1
121-3 or 8120, .	James Curley,	Stoughton, .	W. P. Kennedy, .	8
134-J, Hudson,	W. H. Parker, Gleason-	Stow,	G. A. Patterson, .	5
6-21,	dale. Chas. M. Clark, Fiskdale,	Sturbridge,	C. M. Clark,	6
5-5,	S. W. Hall, South Sud-	Sudbury,	W. E. Baldwin, .	5
46.	bury. A. C. Warner,	Sunderland,	Richard Graves,	6
49-16, Millbury,	R. H. Richardson,	Sutton,	Ransom H. Rich-	6
3806 or 82.	Geo. P. Cahoon,	Swampscott, .	ardson. E. P. Mudge,	2
468-W,	Thos. L. Mason,	Swansea,	A. E. Arnold,	7
320 or 1-3,	Fred A. Leonard,	Taunton,	L. W. Hodgkins, .	7
23-3,	A. R. Paine, Baldwins-	Templeton, .	J. B. Wheeler,	6
12-2,	ville. Harris M. Briggs,	Tewksbury,	H. M. Briggs,	4
161-4 or 102-3,	Elmer C. Chadwick, Vine-	Tisbury,	H. W. McLellan, .	9
No telephone, .	yard Haven. Clayton H. Deming,	Tolland,		
Central,	Char W Fland	Topsfield,	C. W. Floyd, .	3
11-2 or 37-2,	D Y D'	Townsend,	G. E. King,	4
	Walter F. Rich,	Truro,	J. H. Atwood,	9
1,	Otis L. Wright,	Tyngsborough, .	C. J. Allgrove, .	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
1-2, Lee,	H. E. Moore,	Tyringham, .		-
7-2,	E. M. Baker, Upton Cen-	Upton,	G. H. Evans, .	15
51-5,	Lewis F. Rawson,	Uxbridge,	Willard Holbrook,	6
455-M or 58, .	Wm. E. Cade,	Wakefield,	W. W. Whittredge,	1
No telephone, .	Warren W. Eager,	Wales,	M. C. Royce,	6
43-11,	J. J. Hennessy,	Walpole,	P. R. Allen,	7
6	Geo. L. Johnson,	Waltham,	W. M. Ryan, .	1
5-13,	Louis A. Charbonneau, .	Ware,	F. Zeissig,	6
45-23,	Delbert C. Keyes, South	Wareham,	J. J. Walsh,	9
46-6,	Wareham. Jos. D. Vigneaux, West	Warren,	A. A. Warriner, .	6
73-3, Orange, .	Warren. Chas. A. Williams,	Warwick,	Chas. E. Stone, .	6
12-4,	Lester Heath,	Washington, .		_
116. Newton North.	John C. Ford,	Watertown, .	J. C. Ford,	1
North.	William Stearns,	Wayland,	D. J. Graham, .	5
113-4,	Timothy Toomey,	Webster,	C. Klebart,	6
172-W,	Wm. W. Diehl, Wellesley Hills.	Wellesley,	F. M. Abbott, .	7
	Hills. John Holbrook,	Wellfleet,	E. S. Jacobs,	9
74-41, Orange, .	Harry J. McCoy, Wendell	Wendell,	G. E. Mills, .	
74-2,	Depot. Jacob D. Barnes,	Wenham,	J. D. Barnes,	2
3-21,	Fred E. Clark,	West Boylston, .	C. H. Baldwin,	6
768, Brockton, .	W. P. Laughton,	W. Bridgewater,	O. Belmore,	8
37-13, ,	J. H. Webb,	W. Brookfield,	J. H. Webb,	6
5-6,	Louis H. Flook.	W. Newbury.	Frank D. Bailey, .	3
2067-1,	Dana S. Moore,	W. Springfield, .	Geo. W. Hayden, .	6
	Geo. B. Latour,	W. Stockbridge, .		-
203-23,	Wm. J. Rotch,	West Tisbury, .	H. W. Athearn, .	9
75-3, ,	Thos. H. Treadway,	Westborough, .	Geo. Hayden, .	6
111-Y	T. H. Mahoney.	Westfield.		_
	Harry L. Nesmith, .	Westford	H. L. Nesmith,	4
148-14,	C. A. Bartlett, Northamp-	Westhampton, .		
29-4,	ton, Stage. W. H. Waterhouse,	Westminster.	G. A. Sargent, .	
1392-М	Benj. R. Parker,	Weston,	E. P. Ripley,	5
No telephone, .	Herbert A. Sanford, .	Westport,	H. A. Sanford, .	
	Elmer E. Smith, Islington		C. H. Southerland	
154-W,	Edgar S. Wright,	Weymouth, .	C. L. Merritt,	. 8
69-2, South Deer-		Whately,		
field. 104-14,	C. A. Randall,	Whitman,	C. A. Randall,	
1-4,	Henry I. Edson,	Wilbraham,	F. B. Metcalf,	. 6
- 1,	Trenty 1. 1208011,	Williamann,	. F. D. Blettall, .	

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div.
46-2,	J. Edward Pierpont, .	Williamsburg, .		-
34-14,	William Davies,	Williamstown, .	Wm. Davies, .	6
34-4,	Howard M. Horton, .	Wilmington, .	O. McGrane, .	1
29,	Arlon D. Bailey,	Winchendon, .	G. W. Drury, .	6
123-2,	David H. DeCourcy, .	Winchester,	S. S. Symmes, .	1
201-12, Dalton, .	Amos Ferry,	Windsor,		-
		Winthrop;	W. A. Whittemore,	2
110,	Frank E. Tracy,	Woburn,	J. H. Kelley, .	1
7112, Park,	Arthur V. Parker,	Worcester,	H. J. Neale,	16
10-22,	Chas. Kilbourn,	Worthington, .		-
	Geo. H. E. Mayshaw, .	Wrentham,	W. Gilmore,	7
53-33,	Jos. W. Hamblin,	Yarmouth, .	C. R. Bassett, .	10

WINCHENDON SHOWING MUCH INTEREST IN FORESTRY.

One of the first towns in the State to co-operate with this department was the town of Winchendon. Practical undertakings were begun by some of the farsighted and stable business men of the town, and these have been splendid object lessons. The late Mr. John Folsom, who had been the official in charge of the town trees for years, spent his last days in interesting his townsmen in reforestation and in practicing modern forestry. Winchendon village is a beautiful New England hamlet nestling in a valley of the town, which borders the New Hampshire line. and at an elevation of over 1,000 feet. The chief industries of the town are those requiring quantities of forest products, particularly white pine. Winchendon is noted for its productions of wooden pails, tubs, toys, ice-cream freezers and a variety of manufactured wooden products. The numerous factories here established are dependent for their future raw material upon the forests. The country about Winchendon is ideally adapted for forestry, and offers an exceptional opportunity to demonstrate how valuable an asset modern forestry can be made to a Massachusetts or New England town. In a natural forest country, like that found in rural sections of this State, there are great possibilities for our people to gain a



A view from the lookout station on Robbins Hill, Chelmsford, looking toward Boston. Note the amount of forest country.



A forest nursery in the town of Neustadt, Ger. Were some of our rural towns to start such an enterprise in connection with the office of forest warden, tree warden and moth superintendent, it could be made a valuable auxiliary toward establishing town forests.



splendid and permanent livelihood, were we to develop similar industries for using and manufacturing home-grown forest products, as Winchendon is doing. This type of environment also builds up and engenders a healthful and happy people.

The moth scourge is just beginning to make some inroads in Winchendon, but it is believed that it will never amount to anything here, as the town immediately purchased up-to-date equipment, and will not allow the moths to trespass. At a recent meeting at which the State Forester gave an illustrated talk, showing slides comparing conditions in Massachusetts with the Black Forest of Germany, he emphasized how the town of Winchendon might be made the Black Forest town of New England, and the idea seemed to meet the general approval of both officials and citizens.

The town set out 10 acres to white pine last year as a start toward a municipal forest, and plans are already made for setting a much larger area next spring, and the acquisition of more territory. The Murdock Company, the Brown Brothers, the Converse Company and various individuals have already set out several hundred acres in this and adjoining towns. The Brown Brothers have about 1,000,000 two-year-old seedlings in their nursery at the present time, and Mr. Elisha Whitney, the president of the Murdock Company, has purchased for next spring's delivery a very large consignment. The accompanying photograph (see frontispiece) was taken by the writer of one of the Murdock Company's four-year Scotch pine plantations in the town of Ashburnham.

The true forestry spirit is to be found in Winchendon, and it is hoped that other rural towns may emulate this example. See, also, the Winchendon forest fire auto truck, a photograph of which is to be found in this report.

Forestry Practices as a Key to Moth Control.

This year for the first time an organized attempt has been made to apply forestry to the moth problem. Work along this line has been done for several years, notably on the North Shore, but the immediate purpose of most of the thinnings made was to facilitate spraying and creosoting rather than to

eradicate the favorable moth food. This year a special department was inaugurated to carry on this work under a trained forester.

The various means of controlling the moths may be classified under three heads, — direct entomological methods, indirect entomological methods and forestry methods. The direct entomological methods seek the destruction of the moths in one of their various forms by human agency, as in spraying or creosoting. The indirect methods seek the propagation of parasites or disease which will destroy the moths. The forestry methods seek the encouragement of tree growth which is unfavorable to the moths.

It has been found, from our own and from European observations and experiments, that although it will eat practically all kinds of vegetation, the gypsy moth thrives only on a limited number of species of trees. These trees, which are the oaks (especially the white oak), willow, fruit and cherry trees, and probably the gray birch, may be called "non-resistant" trees. Unless a large proportion of their food consists of the leaves of these "non-resistant" trees, under ordinary conditions the moths will soon pass on to a more favorable feeding ground or die. Therefore forestry methods, rather than attempting to destroy the moths themselves, would destroy their food. If we grow forests of resistant species, as conifers, maple, chestnut, ash, etc., the moths will cease to be destructive.

To shade trees and to ornamental or park woodland, where hardly a tree can be spared, these forestry methods do not apply very extensively, but in wild woodland spraying is too expensive and other methods are costly or inefficient, and we must rely on parasites, disease and resistant forest conditions if we are to control the moths. This is the way they are controlled in Europe, where they have existed from time immemorial, and this is the way we must eventually control them in this country. It is a vast work, the changing the forest conditions of this State, but if we can change the poor oak forests into pine forests, for which most of the land is naturally suited, the gypsy moth will turn out a blessing in disguise.

The white oak seems a doomed tree in the moth-infested region. Weakened by moth attacks, the "agrilus," or chestnut

borer, finds an easy entrance and soon kills it. The other oaks seem a little more resistant to both the moths and the borer, but except in very favorable soil it would not seem advisable to attempt to grow them unless they can be well taken care of by spraying. If oak is grown it should be kept in pure stands, for if grown in mixture, as with pine, both the oak and pine will be attacked. One owner of a very fine stand, consisting mostly of large white oaks, desired very much to save them. They were badly infested, and he spent large sums of money in spraying and creosoting them for several years. On account of the height of the trees, and the difficulty in always getting them sprayed thoroughly, they were eaten enough so that the borers found entrance, and this year it has been necessary for him to cut them all off after a large part of the stand had died. This shows the difficulty in saving white oak.

The primary purpose of moth thinnings is to remove from a stand non-resistant trees, and to leave and encourage the growth and reproduction of the resistant species. The secondary purposes are to aid in taking care of the stand by other and more direct methods of moth control; to increase the æsthetic value of the stand; to decrease the fire danger; to salvage the dead and dying trees; and increase the growth and health of the remaining trees by giving them more light and room. A moth thinning will not be efficient in checking the moths without the aid of spraying, unless practically all the non-resistant trees are removed and kept out. In a stand of pure oak, for instance, it will be necessary to cut clear and replant with resistant trees. In a stand which is 50 per cent. or more resistant, and the rest oak, the removal of all the oaks would still leave the ground fairly well shaded, and no replanting or spraying would be necessary. Owners should realize that it is foolish, year after year, to creosote and spray a grove of trees which is mostly resistant, when if they would only cut out the non-resistant trees and brush no other care would be necessary. This thing has been observed in a number of cases and persisted in, even after emphatic advice to the contrary. An interesting case was noted in Cohasset this year. There was a small area of large mixed hard woods surrounded by a growth of similar character. About half the trees were oak

and about half were of resistant species, as ash, hickory and maple. The moth infestation was very heavy, and when the area was examined in the early spring there were several hundred gypsy moth egg clusters on each tree. The owner did not want to spray, and he was advised to cut down all the oaks and await results. He did this, leaving only a very few oaks. He neither painted nor sprayed, nor did any of the surrounding owners. In July, when the moth eating was about completed, the area was again examined. The results surprised even the one who had advised this treatment. Whereas in the surrounding area there was almost a complete defoliation of all species, on the thinned tract practically all the leaves were intact, with the exception of those on the oaks that were not cut out. Of course this case may be exceptional, yet we believe it reveals the possibilities of resistant thinnings.

In the many areas of woodland where, on account of the large proportion of oak and the æsthetic value of the woods, a totally resistant thinning is impractical, moth thinnings are of great value as an aid to spraying. In fact, it is almost impossible to spray woodland effectively unless a certain amount of thinning has been done. The thinning makes the work more effective and lessens the cost from 25 to 60 per cent. In one area that a year ago was sprayed, unthinned, at a cost of nearly \$10 per acre, and even then was partly defoliated, this year, after thinning and brush-cutting, was sprayed at a cost of a little more than \$4 per acre, and practically no stripping occurred. The cost of thinning, including cutting and burning the brush, was about \$5 per acre, deducting the value of the wood cut. From this it is evident that in one year this thinning was a paying proposition to the owner. In thinning that is to be followed by spraying, and wherein the element of looks enters considerably, it is necessary to do much more cutting and disposing of brush than in straight, resistant thinnings. The care of the brush is one of the large factors of expense in this work. In purely resistant thinnings it is only necessary to cut the non-resistant brush, as scrub oak, witch-hazel and gray birch.

A good method of handling a stand that has a very high percentage of oak growth is to make a heavy thinning, cutting



A neglected and badly moth-infested woodland. The growth here is not large enough to pay for thinning, and contains quantities of dead trees, which condition is one of the worst to deal with. About all that can be done is to cut it clean and replant. There are many acres of this type and they are most discouraging propositions to the owners. Starvation methods may be practiced under favorable circumstances.



A woodland thinning to assist in controlling the gypsy moth. The favorite food trees are removed. The white pine is encouraged. A process of building over the forest. A thinned forest like this can be sprayed and looked after at far less expense. The forest products removed pay for the treatment. One hundred acres on the Weld estate, Dedham.



all white oaks if possible, and to follow this with underplanting of pine. Within ten years or so the rest of the oaks can be removed and a pine stand will result. This is not practicable, however, unless the area can be sprayed if necessary in the meantime. In many places examined there was considerable natural pine reproduction, and a thinning would aid very much in bringing it along. In other places, where the woodland is desired for landscape effect, as along roads or bordering fields, and where the growth is largely non-resistant, and spraying impractical over the whole area, then a strip can be left along the edge, but a clean cutting made in the interior followed by natural resistant reproduction, if possible, or planting. The outside strip can be cared for, and the interior will eventually sustain a moth-resistant growth, while the effect will not be injured.

Although we have not had sufficient experience as yet in this thinning work to show many results or make absolute conclusions, there are a few opinions which we have arrived at and which may be of interest to owners of infested woodland. They are as follows:—

- 1. Moth thinnings are constructive. The owner who uses direct methods of moth control must expect to keep them up year after year without any sure relief. By growing a resistant forest he is making the moth problem solve itself.
- 2. Moth thinnings are advantageous to the owners of park or ornamental woodland or land awaiting development. The main factor in land of this type is that the wooded character of the area be maintained and at the least possible expense. Thinnings will improve the general condition and attractiveness of the area and will make it much easier and cheaper to take care of in the future.
- 3. Moth thinnings are advantageous to the owners of woodland which is chiefly valuable for the wood it produces, provided the growth is of merchantable size. Woodland of this type cannot be annually sprayed because it is not worth it. If the owner leaves it alone, eventually most of the non-resistant trees, and many of the resistant species, will be killed and the stand greatly depreciate in value. A thinning of the non-resistant trees in woodland of fair to good quality will pay for

itself at least, and will leave a more valuable stand than if it had been left alone. It is also easier to cut live trees than dead ones.

- 4. Moth thinnings are advantageous to the owners of poor or sprout growth, where there is a considerable proportion of young pine present. The wood will not pay for the work, but the development of pine will. If left alone, especially where the growth is gray birch mixed with pine, the moths will practically destroy the whole value of the growth, which if properly conserved would prove to be considerable.
- 5. Moth thinnings are cheaper and more effective if undertaken before the moth infestation becomes serious than if made afterwards.

Considerable cost data have been collected from the thinning operations carried out under the direction of this department, but not enough to give any certain figures as yet. The main factors in the cost are the efficiency of the labor, the size and thickness of the growth, the severity of the thinning, the amount and method of brush-cutting and disposal, and the utilization and market of the product. In general terms it may be said that a thinning which will yield 7 or 8 cords to the acre will pay for itself, allowing for the burning of the slashing, provided that there is not an unusual amount of brush to be cut, and that ordinary labor and market conditions prevail. The cost mounts rapidly if large quantities of brush are to be cut. The cheapest way of doing work is by the cord, under good supervision, or an experienced crew working by the day may do as well. The profits may be considerable if there are many ties, poles or piles to be cut.

Work accomplished this Year.

Since this work was organized a gratifying amount of interest has been shown in thinning work. The work carried on has not been primarily experimental in character, but rather educational and practical. The United States Bureau of Entomology in connection with the Forest Service, is now carrying on experiments in moth thinnings under Mr. Clement, from which we anticipate some very practical data.

On account of the obvious necessity of getting this work started as rapidly as possible, we did not await the usual course of events and have the owners come in to us for advice and assistance, but rather went out after the owners and proffered our services. With the aid of the district and local moth superintendents a list was made of the owners of the infested woodland of the State, and to each owner was sent a letter offering our advice and help, and enclosing a blank to be signed if an examination of the property was desired. Over 2,000 such letters were sent out, and about 340 have returned the signed examination application to date. Up to December 1 we have been able to make 174 of these examinations, covering an area of about 9,628 acres. About 25 owners up to the present time have started this work, either under our supervision or with our assistance, and by these operations about 1,000 acres will have been put into condition. This does not include the thinnings done by the local or district moth superintendents, which will cover a large aggregate area.

In many towns all the roadsides and considerable private property have been thinned out by the local men, and in the town of Dover and on the North Shore considerable work has been done under special funds.

The aid offered to owners of infested woodland, outside of free advice, has been the marking of trees, the marketing of the wood, the furnishing of labor, and the actual supervision and management of the thinnings. In several cases we have found contractors who would cut the wood under our specifications and inspection and pay the owner for it. We have now three trained crews who will do the work under our direction for any owner who desires them, and will pay the actual cost. We have in other places furnished woodchoppers who cut by the cord under the supervision of a trained foreman. We expect to start out several new crews shortly.

A list of the areas cut or being cut under our direction and supervision follows:—

	Tow	N.		Owne	Area (Acres).			
Dover, .			,	Geo. D. Hall,	۰			27
Millis, .				A. H. Wheeler,				12
Dedham,				Stephen M. Weld, .				70
Dedham,				Mrs. J. C. Fairchild, .				10
Westwood,				C. J. Lennon,				3
Norwood,				Edw. Cunningham, .				20
Dedham,				Karlstein estate, .				. 83
West Barns	table			Howard Marston, .				60
Norwell,				Nathan Cushing heirs,				15
North And	over,			Miss C. A. French, .				45
Cohasset,				Mrs. Sarah Wheelwright,				20
Dedham,				Mrs. Harriet Rodman,				80

Cost. — In the above list seven of the operations will have been carried on at no loss or a small profit, and all but two at a net cost not greatly exceeding \$5 an acre. The other two contained so much brush that the cost was larger, but the owners felt well repaid.

Some cost data from the operation on Karlstein estate in Dedham follow. This operation is not quite finished at this writing, so the data are not absolutely complete. The work was done by a crew paid from \$2 to \$2.25 per day, under an experienced foreman. The men live in a camp provided on the estate. The conditions on the estate were as follows: the growth was mostly a medium hardwood stand, with about 75 per cent. oak and about 35 per cent. white oak, and with considerable pine reproduction in places. The moth infestation was severe, although as yet not more than 10 per cent. of the trees had been killed. The brush was not very heavy, but a fair amount had to be cut. The estate was being held for development, and the purpose of the thinning was to put it into shape so that a wooded condition could be maintained at the least possible expense. The general rule of the cutting was to cut practically all white oaks, all dead and inferior trees, and as many of all species of the other oaks as possible; to cut all brush necessary, to split and pile the wood in 4-foot lengths; to burn the brush and slashing, and to encourage the growth of the pine as much as possible.



A mixed growth of hard and soft wood that is sure to be destroyed by the gypsy moth unless the owner spends large sums of money in spraying and treating. The only practical forestry solution is to immediately cut out the hardwoods and give the whole area over to the white pine. In an infested stand like this the pines are killed outright in a year or two; therefore, owners having similar woodlands should give them early attention. The pine in clear stands by itself is perfectly resistant to the moths.



A severe thinning, to be followed by underplanting with white pine. The product, which was largely white oak, sold for enough to meet the expense. Gypsy moth suppression work on the Karlstein property at Dedham. This property was stripped the past season.



Cost Data of Operation on Karlstein Estate.

Cutting and piling, based on 82.5 acres; burning, based on 47.5 acres. Total cut: 559 cords of wood, 90 ties, 6,000 feet of pine. In working data this is called the equivalent of 565 cords.

				Per Cord.	Per Acre.	Total.
Wood and brush cutting	,1			\$1 97	\$13 48	\$1,112 05
Brush piling,				15	1 00	83 00
Brush burning, .				25	1 80	148 102
Other expense, 3 .				04	25	21 00
Supervision, 4				15	1 01	84 00
Total,				\$2 56	\$17 55	\$1,448 152

¹ Includes stacking wood. Brush cutting is estimated at about 8 per cent.

Other items of expense which are not included are the cost of a camp for the men and of tools which will not greatly exceed \$25 in this case.

In conclusion we would say that this department is anxious to get in touch with all the owners of infested woodland in the State, to give them advice and all the help possible in solving the woodland problem. This work cannot be carried on without the help of the owners, who are the parties most vitally affected.

FOREST MAPPING.

This summer a beginning was made in work we have long desired to attempt, namely, the making of an estimate of the acreage of forest of different types and sizes; and, in conjunction with this, work out a forest map on which is shown, so far as practicable, what the land is producing.

It is possible to hire, in the summer, forest school students who are cheap and efficient men for this purpose. The work was carried out under the direction of Mr. Harold Fay, one of the assistant foresters in the office, who had the assistance of four forestry students, picked men from as many forestry schools.

As it was not possible, with the means at hand, to cover the

² Estimated.

³ Includes saw filing, scaling wood, etc.

⁴ Includes time spent by foreman in directing men and marking trees, when he was not actually engaged in productive work.

entire State in one season, it was decided to attempt the work county by county, and this year Worcester County was chosen. This county has been covered, with the exception of a few towns.

The method of field work was an adaptation of a large-scale timber cruising system, which we felt gave a maximum amount of information for a minimum cost. Each man worked one town at a time alone, running lines one-half mile apart, by compass and pace, from one boundary to the other. Record was kept of the length of each type, and type boundaries were sketched, so far as practicable, in an especially arranged note book checked off in scale with the large maps, to which the data were easily transferred. These maps, the scale of which is 976 feet to 1 inch, are enlargements from the United States topographical sheets, and we hope will be the basis for permanent forest maps of each town in the State.

By means of symbols the rough proportion of different species of trees growing on the ground traversed is shown, and by numbers, their approximate size. A rough estimate of the percentage of stocking was made. The number of white pine per acre was estimated, to enable a more accurate estimate of this, the most valuable timber, and especially to give an idea of the acreage where the occurrence of scattered white pine gives a chance for converting inferior hardwood forests into pine, by so handling as to secure more pine reproduction. Areas of exceptional hazard for forest fires were located by symbols on the maps, as were wood lots infected in different degrees by the chestnut bark disease.

From this work we feel we shall have a very reliable estimate of the acreage of different types of forests of different age classes for the county as a whole, and a fairly reliable estimate so far as the unit towns are concerned. The completeness and accuracy of the maps depend largely upon whether the towns have much or little open land, and uniform or frequently changing forest types.

So far as we know no other State has begun to collect data which will allow so accurate an estimate of its present stand of timber, and of what is likely to be produced during future periods. In addition to the maps, which also furnish the basis for acreage and timber estimates, a forest report was made for each town, giving a general account of the forest conditions, lumbering and woodworking industries, prevailing prices of timber and of unproductive land, the names of some of the principal landowners, forest-fire conditions, and the extent of the chestnut bark disease.

The plan is to keep these maps and reports on file at the office, so that forest data will be available for reference whenever a private individual or the department contemplates forestry work in any town.

As a sample we reproduce herewith the map of Bolton, which town was worked by Mr. J. R. Simmons, together with his forest report on the town, and a summary of the acreage estimates compiled from the map.

In forest description of tracts shown on the map, the letters and symbols at the left represent "type;" these are followed by "size-class" figures, then the number of white pine trees per acre (a line drawn above the figures indicates when they are suppressed white pine reproduction). Following the white pine figures comes the estimated percentage of stocking, and last, symbols representing fire hazard, chestnut bark disease, etc., if there chance to be any.

Symbols showing occupation of the soil are arranged in the order of prominence of the type or species. Softwoods when equalling 10 per cent. or more of the stand, and hardwoods when equalling 20 per cent. or more, are shown if not more than three symbols representing occupation of the soil are used in all.

For key to symbols on the map, see the first two columns of acreage estimate table.

FOREST SURVEY ACREAGE ESTIMATES, TOWN OF BOLTON, MASS., NOVEMBER, 1913.

	Size Class,	4, 4-3	3-4, 3	3-2, 2-3	2, 2-1	1-2, 1	
TYPE SYMBOL.	Approximate Age, based on White Pine and Chestnut (Years),	1-12	13–25	26-40	41-60	61 plus	Totals (Acres)
	Species.						
	White pine,	20	424	166	347	14	97:
,	White pine and gray birch, .	100	188	-	-	-	28
3,	Mixed hardwood and white	-	161	50	28	44	28
	pine. Mixed softwood,	_	1,1	2	9	_	2
,	Chestnut,	-	128	527	383	55	1,09
and E C,	Chestnut with oaks,	424	887	255	250	-	1,79
,	Gray birch,	44	112	_	_	_	15
·	Oaks	150	419	155	153	_	87
	Mixed hardwood.1	_	185	_	2	_	18
r,	Red maple,	88	244	_	_	_	33
t.	Maple swamp,	_	424	164	_	_	58
	Pitch pine,	_	101	33	_	_	13
	TOTAL WOODLAND AREA,	826	3,284	1,352	1,152	113	6,72
							Acre
otal woodla							6.7
- Agricult	-4	•	• •			. 4,37	
— Open pa — Brushy		•	•		•	. 90:	
- Useless		•			:	. 9	
Water,						. 3	
							- 5,61
	al area of town,					•	12,33
Tot							
⊗—Chestr	ut blight.						
⊗ — Chestr ⊽ — Fire h	out blight.						. 57
⊗—Chestr ⊽— Fire h P— Drains	ut blight. ızard,		: :		:		. 8
⊗—Chestr ⊽— Fire h P— Draina Scatter	ut blight.				:	• • • • • • • • • • • • • • • • • • • •	-

¹ In this table species growing in mixture have been proportioned and recorded in their own column as though of pure growth.

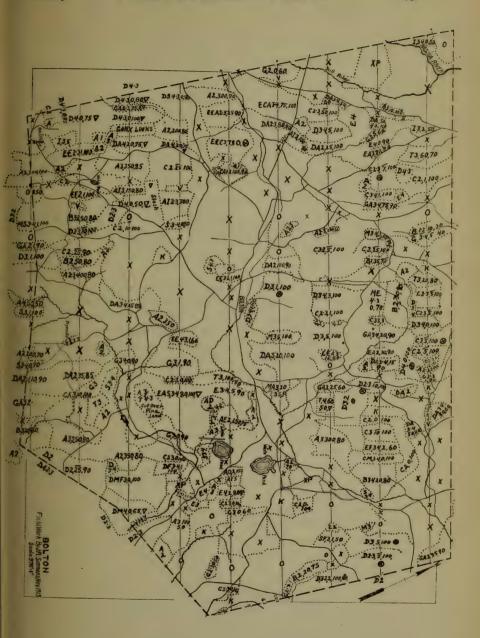
² 55 per cent. of town area.

^{3 45} per cent. of town area.

^{4 5} per cent. of town area.

^{5 31} per cent. of town area; 57 per cent. of woodland area.

⁶ Total acreage of town was figured from map on page 39.



FOREST REPORT OF TOWN OF BOLTON.

BOLTON, MASS., November, 1913.

Bolton lies along the eastern border of Worcester County just northeast from the city of Clinton. The Boston & Maine Railroad cuts it at the southeastern and southwestern corners, and its best markets, outside of Clinton and Hudson, are Worcester, 15 miles, and Boston, 30 miles, distant. The chief industries are dairy and fruit farming. The town is essentially a farming community, there being but three small villages. The lack of trolley lines is compensated by good roads leading from the town to its markets.

Topography.

The topography is irregular with hills and valleys. The general trend is north and south, with the ridges frequently broken by brooks and gullies. Highest hills are 600 feet.

Soils.

Light sandy soil, generally fertile and fairly deep, having gravel, and some clay subsoil. Black soil in the swamps and on some farms where draining has been done. South of Bolton village, on the west side of the Berlin road, are about 75 acres of moist land, difficult of drainage but bearing good hay. Some parts of the maple swamp on the opposite side of the road could be cleared and drained for agriculture. On the hills the soil is good, quite free from rocks, and raises apples and peaches.

Woodland.

Proportion of wooded to cleared land one-third to two-thirds,¹ according to the report of the assessors to the commission on taxation of waste and forest lands. The general appearance of the country would make this estimate seem too low for forest land. A considerable amount of good high land has been recently cleared of birch and sprouts for fruit growing.

General condition of forest, good, especially in the pine, oak and hard-wood types. There is a good layer of humus. Principal species are pine, chestnut and oak, in clear and mixed stands; ash and hickory are common in the mixture, and as roadside trees. Suppressed pine is common in the chestnut and oak types.

LUMBER AND WOODWORKING INDUSTRIES.

Saw Mills.

1. Century Mill, W. J. Webber, proprietor, Bolton, Mass., cuts chestnut and pine; 150 M during the last two years, mostly for box boards which are sent to Hudson, Mass. Stumpage, \$10 to \$14 per M. Box

¹ See figures in table compiled from map.

boards, F. O. B., Hudson, \$22. This is the only lumber mill in Bolton, and it is idle most of the time.

2. E. M. Walcott, Bolton Village, Mass., cuts about 200 cords of wood per year.

Land Owners.

The largest holdings are considerably under 200 acres, and very little land is for sale. Owners of over 60 acres are checked in the accompanying assessors' list.

Waste Land.

Not extensive in area. Confined to (a) a few acres along the Lancaster boundary, in swamp, burned oak and hard pine land; (b) a strip of old pasture in the northeast about three-quarters of a mile wide, some of which is brushy; and (c) a very small burned area along the Hudson boundary. Average price of waste land \$5 per acre.

The only person reported as having waste land for sale is Mr. Blanchard, of Blanchard & Gould; he is said to own two lots of 50 acres each, adjoining.

Fires and Fire Damage.

No recent fires reported, though some slash areas exist, offering considerable risk, located (a) along Bolton and Laneaster boundary, north of Bolton station on cut-over lands and sprout growth; and (b) some portions of the ridge southwest from Vaughn Hill in the northwest.

A small burn occurred three to five years ago near the Hudson road in the eastern corner of the town, and southeast from Long Hill, and entered some distance into a large chestnut and maple wood lot. The whole burn covered about 50 acres of sprout.

Chestnut Bark Disease.

The chestnut blight occurs in all parts of the town, the worst being in the western and northern portions. A very large area of chestnut north of the village appears, as yet, to be in fair condition, with probably not more than one infected tree to the acre. Some of the wood lot owners interviewed have made a practice of cutting for cordwood blighted trees only, and expressed the opinion that this scheme would probably become popular among owners of timber in Bolton.

REFORESTATION WORK.

The reforestation act passed in 1908 makes provision for any one owning waste land suitable for replanting to deed it over to the State, with the provision that the owner, his heirs or assignees may redeem it at any time within ten years by paying the actual cost of planting. This cost varies from \$7 to \$10 per acre, according to the size of the tract, accessibility and

age of stock used. There is also a section of the act which enables us to buy land at not over \$5 an acre, and not over 80 acres in one tract in any one year.

Under this act some 4,489 acres have been acquired, as the following list shows. Of these, about 1,000 acres are owned by the State outright with no redemption clause, the land having been bought at a price of from \$2.50 to \$5 per acre. Where land has been bought, it is the policy of the office to purchase adjoining land the following year in order that individual lots may be more readily handled. We have advocated the removal of the 80-acre limit, as the average cost of planting is much less on large lots, and it is also often cheaper to acquire a large lot than a number of small ones.

These tracts will increase much in demonstration value in the next few years, as it takes a plantation from five to ten years to reach a height where it will attract attention. Even now some of the older plantations set in 1909 have created an interest in forest planting.

This law seems to be meeting with the aims of those who first advocated it, as throughout the State there are many land-owners who would not sell their land outright or would not set it out themselves, but who are willing to have the work done by the State Forester. It is safe to say that not over 200 acres of the 5,000 and over would be restocked to-day had it not been for this act enabling the owners to turn their land over to the State to be planted.

This year we have planted 782 acres of land, while the work of filling in and replanting lots where loss was due to the last few years' drought has been pushed with vigor. During the winter months a number of old lots were cleared of brush which had grown up and was interfering with the trees set.

FOREST NURSERY.

This fall, on land of the State Farm at Bridgewater, which was prepared for a nursery, we transplanted over 500,000 two-year old seedlings, consisting of white pine, Scotch pine and white ash.

The work was done by inmates of the farm under direction of a foreman employed by this office. By using the farm labor



A splendid stand of large white pine with a relatively small mixture of hardwoods on the fine Rodman estate in Dedham. The pine tops show the ravages of the gypsy moth. A number of the large pines are past redemption. This whole estate is being thinned out at the present time. The hardwoods are being taken out, together with the dead pines. Had the hardwood been removed early all of the pines could have been saved.



in the nursery we shall be able to do much more transplanting than formerly. The State Farm officials, Superintendent Blackstone and Mr. Hunt, have aided us in every way possible, and another spring will have additional land cleared, so that we shall have about 10 acres in the nursery, and be able to do a large amount of spring transplanting, and also raise not only enough transplanted stock to do our entire planting work, but enough to supply other State institutions with these transplants instead of seedlings.

In our nursery at Amherst we have about 7,000,000 trees, about 1,500,000 of which are three and four year transplants suitable for our spring planting.

This year we supplied the Metropolitan Park Commission with 300,000 two-year white pine seedlings, the Metropolitan Water Board with 250,000 two-year white pine seedlings and 150,000 three-year Norway spruce seedlings, and a number of the commissions with smaller amounts, — a total of 734,000 supplied for use on State land, outside of land planted under the reforestation act, by this department.

STATE PLANTATIONS, 1913.

Tow	N.		Acres.	Type of Land.	Variety planted.
Gardner, .			87	Cut and burned over,	White pine, Norway spruce
Rutland, .		. '	55	Cut-over land,	White pine.
Leverett, .			24	Cut and burned over,	White pine.
Leverett, .			66	Cut and burned over,	White pine, Norway spruce
Shelburpe, .			421/2	Cut and burned over,	White pine, Norway spruce
Nantucket, .			83	Sandy plain,	White and Scotch pine.
Westminster,			80	Cut-over pasture, .	White pine, Norway spruce
Spencer, .			80	Cut-over pasture, .	White pine, etc.
Spencer, .			80	Cut-over pasture, .	White pine, etc.
Lancaster, .			323/4	Cut-over light land, .	White pine.
Taunton, .			64	Cut-over sprout land,	White pine.
Boxford, .			10½	Run-out mowing, .	White pine and red pine.
Freetown, .			9	Cut-over land,	White pine.
Boxford, .			241/4	Cut-over land,	White pine.
North Andove	er,		44	Cut-over land,	White pine.
Total, .			782		

Amherst Nursery, 1913.

	VAI	RIETY						Age (Years).	Number of Trees.
White pine seedlings, .								1	3,000,000
White pine seedlings, .								2	2,000,000
Red pine seedlings, .								2	200,000
Norway spruce seedlings,								2	216,000
European larch seedlings,								2	66,000
White ash seedlings, .								2	70,000
White pine transplants,								3	1,091,000
White pine transplants,								4	344,000
Red pine transplants, .								. 3	21,000
Norway spruce transplants	9							3	18,000
Total,									7,026,000
	H	OPF	TATE						
White pine transplants, White pine transplants, Norway spruce transplants				· · ·		·	191	5 3 3	25,000 40,000 30,000
White pine transplants,				· · · · ·	Nu	·	 191	5 3	40,000
White pine transplants, Norway spruce transplants Total,	•					·	 •	5 3 3	40,000 30,000
White pine transplants, Norway spruce transplants Total,	•						 •	5 3 3	40,000 30,000
White pine transplants, Norway spruce transplants Total,	•						 •	5 3 3 · · ·	40,000 30,000 95,000
White pine transplants, Norway spruce transplants Total, White pine transplants,	•						 •	5 3 3 	40,000 30,600 95,000 400,000

PLANTING DONE UNDER THE ADVICE OF THIS OFFICE.1

NAME.	Location.	Variety.	Number of Trees.
Metropolitan Park Commission, .	Blue Hill Reservation,	White pine,	300,000
Metropolitan Water Board,	Wachusett System, .	White pine,	250,000
Metropolitan Water Board,	Sudbury System, .	Norway spruce, .	150,000
Wachusett Reservation Commis-	Princeton,	White pine,	20,000
Bristol County School of Agricul-	Segreganset,	White pine,	2,000
Norfolk State Hospital,	Norfolk,	White pine, hemlock, arbor vitæ.	12,000
			734,000

¹ Trees furnished by State Forester (Amherst Nursery).

Each year a résumé of the season's work has been published, but some may be interested in having a complete summary of the work done under the reforestation act; therefore we have included in this report the following tables classifying the lots by counties and towns. The number of the lot is a part of our record system, and roughly indicates the order in which they were taken over. Where this number appears in heavy type it indicates that the lot was purchased outright by the State, the clause in the deed giving the owner the right to redeem the lot at the end of ten years being omitted. All other lots are subject to the privilege of redemption.

SUMMARY OF LOTS TAKEN UNDER REFORESTATION ACT.

		Lots.	Acres.
Purchased outright without privilege of redemption, .		20	849
Purchased with privilege of redemption,		20	914
Deeded without cost and with redemption privilege, .		66	2,690
Deeded without cost and without redemption privilege,		2	36

COMPLETE LIST OF LOTS TAKEN UNDER THE REFORESTATION ACT (BY COUNTIES).

Lot No.	Town.	Acres.	Year planted.	Lot No.	Town.	Acres.	Year planted.
	Barnstable County.				Middlesex County - Con.		
55	Dennis,	20	1912	36	Shirley,	18	1910
61	Harwich,	15	, 1911	59	Shirley,	191/2	1911
18	Sandwich,	14	1909	104	Groton,	13	-
19	Sandwich,	10	1911	105	Groton,	41/2	_
31	Sandwich,	20	-				
34	Sandwich,	52	1910		Hampshire County.		
54	Wellfleet,	61/2	1912	30	Belchertown,	10	1910
62	Yarmouth,	21	1911	23	Pelham,	16	1909
106	Barnstable,	17	_	24	Pelham,	В	1909
109	Barnstable,	32	_				
					Nantucket County.		
	Middlesex County.			84	Nantucket,	83	1913
49	Carlisle,	40	1910				
50	Hopkinton,	28	1912		Norfolk County.		
51	Hopkinton,	80	1912	74	Dover,	131/2	1912

_				1			
No.	Town.	Acres.	Year planted.	Lot No.	Town.	Acres.	Year planted.
	Plymouth County.				Worcester County — Con.		
10	Carver,	5	1909	12	Spencer,	23	1909
78	Duxbury,	381/2	1912	13	Spencer,	51/2	1909
48	Kingston,	14	1910	43	Spencer,	14	1910
60	Kingston,	140	1911	90	Spencer,	80	1913
70	Norwell,	10	1912	91	Spencer,	40	-
	W			92	Spencer,	80	1913
8	Worcester County.	10	1909	6	Templeton,	107	1909
9	Ashburnham, .	66	1909	26	Templeton,	60	1909
38	Ashburnham, .	533/4	1909	37	Templeton,	50	1912
39	Ashburnham, .	94	1911	1	Westminster,	40	1909
40		14	1911	2	Westminster,	40	1909
56		63	1911	14	Westminster,	921/2	1909
71	Ashburnham, .	81/2	1912	15	Westminster,	36	1909
72	Ashburnham, .	19	1912	16	Westminster,	39	1909
73	Barre	38	1912	87	Westminster,	80	1913
45	Brookfield.	37	1910	88	Westminster,	80	-
47	Brookfield,	70	1910	89	Westminster,	7	-
57	Fitchburg.	27	1911	100	Westminster,	80	-
79	Gardner,	87	1913	107	Gardner,	16	-
27	Gardner,	93	1909		Essex County.		
44	Holden,	50	1910	7	Andover,	40	1909
3	Hubbardston, .	40	1909	99	Andover,	44	1913
4	Hubbardston, .	14	1909	96	Boxford,	101/2	1913
17	Hubbardston.	54	1909	98	Boxford,	241/4	1913
21	Hubbardston.	40	1909	25	Rowley,	81/2	1909
22	Hubbardston, .	10	1909			-/2	1
42	Hubbardston.	108	1910		Bristol County.		1
52	Hubbardston.	40	1911	69	Attleborough, .	24	1911
53	Hubbardston, .	34	1911	97	Freetown,	9	1913
63	Lancaster,	74	1911	94	Taunton,	64	1913
66	Lancaster,	81/2	1911		Franklin County.		
93	Lancaster,	323/4	1913	67	Buckland,	166	1911
75	Oakham,	80	1912	69	Buckland,	11	1911
20	Paxton,	55	1909	101	Buckland,	75	_
58	Paxton,	45	1911	32	Colrain,	52	1910
80	Rutland,	55	1913	33	Colrain,	169	1910
11	Spencer,	35	1909	41	Colrain,	80	1912
		1				1	

Lot No.	Town.	Acres.	Year planted.	Lot No.	Town.	Acres.	Year planted
	Franklin County —Con.				Franklin County		
25	Colrain,	80	1910	95	Warwick,	27	1913
29	Colrain,	80	1910	102	Warwick,	30	-
64	Greenfield,	4	1911	103	Warwick,	29	-
65	Heath,	41	-	108	Buckland,	10	-
81	Leverett,	24	1913		Berkshire County.		
82	Leverett,	66	1913	76	Becket,	10	1912
5	Montague,	26	1909	35	Peru,	68	1910
83	Shelburn,	421/2	1913	77	Peru,	12	1912

FOREST MANAGEMENT WORK.

The established policy of making examinations of woodland property, either public or private, and of giving advice in connection with the proper management of the same has been continued. A list of these examinations follows:—

Examinations.

Ow	NEI	R.			Location of	Pro	perty		Area (Acres).
Irving Smith, .					Ashburnham, .				2,500
Worcester Park Boar	d,				Worcester, .				200
Concord Golf Club,					Concord,				85
John Gifford, .					Sutton,				150
F. F. Baldwin, .					Hopkinton, .				300
Jas. Richardson,					North Leominster,				34
Fred'k Bailey, .					Chelmsford, .				24
W. E. Barton, .					Foxborough, .				60
L. T. Reed, .					Cummington, .				60
Miss F. Rogers,					Cummington, .				40
Miss F. Rogers,					Cummington, .				60
Miss F. Rogers,			٠,		Cummington, .				20
Miss Julia Steere,					Cummington, .				20
Miss Julia Steere,		٠			Cummington, .				15
Mr. Alfred Mellor,					Cummington, .				175
J. Baldwin, .					Marion,				50
Ira Hersey, .					Foxborough, .				75

Owner.		Location of Property.	Area (Acres
Miss E. Ferguson,		Cummington,	20
Mrs. B. V. How,		Dracut,	205
Park Board,		Walpole,	20
Canaan Line Company,		North Marlborough,	400
A. Harlow,		Cummington,	60
E. Drake,		Sharon,	5
Park Board,		Lynn,	2,600
W. T. Porter,		Dover,	50
Mr. E. Pettingill,		Cummington,	200
Farm and trade school,		Thompson Island,	15
Fish and Game Commission, .		Wilbraham,	50
M. Farnsworth,		Shirley,	1
Faunton State Hospital,		Taunton,	50
E. P. Ripley,		Weston,	8
D. Hough,		Vineyard Haven,	40
Lakeville Sanatorium,		Middleborough,	75
Mixter Farm,		Hardwick,	30
Edith S. Price,		Topsfield.	25
State Sanatorium,		North Reading,	123
R. C. Robbins,		Hamilton.	3
Robbins Estate,		Tyringham,	500
W. G. Vinal,		Marshfield,	20
L. C. Wason,		Canton,	25
Vatcha Club.		Marthas Vineyard,	500
G. E. Watson,		North Leverett,	200
dr. Way,		South Sudbury,	20
Ars. F. E. White.		North Brookfield.	13
Vater Board.		Winchendon,	150
Ioses Williams.	•	N	75
3 TF 411		C1 .	50
Geo. Baker,	• •		30
V. C. Brown,			50
D C 11	•	Dedham.	90
T. D. Coolers	• •	a	90
	• •		25 12
C. H. Dana,		Weston,	1
		Buzzards Bay,	30
Ramage Paper Company,		Monroe Bridge,	10,250

The above list contains 54 examinations covering an area of 10,250 acres, expense, paid by landowners, \$30.33.

The number of examinations made this year is six less than given in the last report. The area examined is, however, increased by 4,502 acres. Many examinations in the eastern part of the State that formerly came under this department have been turned over to the moth end of the work, so that both in number and area the work has shown a large increase during the past year. Examinations in chestnut woodlands affected with the bark disease have also been classified separately, and this too would tend to lower the number handled by this department.

SURVEYS.

The following is a list of the lots taken over for reforestation and for which surveys have been made. Maps in triplicate for these lots are on file at this office.

SURVEYS FOR PLANTATIONS.

Ov	VNE	R.				Tow	Area (Acres).			
E. P. Churchill,						Freetown,	٠			9
F. D. Lewis, .						Groton,				4
Mary F. Pierce,						Freetown,				70
F. B. Lewis, .						Groton,				13
Geo. Davis, .						Shelburne, .				42
State lot,				٠		Manchester, .				7
H. Fiske,						Buckland, .				75
H. Fiske,						Buckland, .				10
E. Smith,						Barnstable, .				7
E. Smith,						Barnstable, .		۰		17
F. H. Webster, .			٠			Warwick,				31
A. P. Webster, .						Warwick,				28
H. S. Hodgman,						Montague, .				26
H. C. Harrington,						Westminster, .				80
H. C. Harrington,						Gardner,				16
Calvin Benson,	۰					West Barnstable,				32
F. H. Rhea,						Boxford,				10
Total,					٠,					477

The total surveyed area for which maps have been made and are on file is 2,380 acres.

Working Plans.

Besides the above surveys there have been made four others, and the necessary data collected with which to produce working plans. These working plans will be completed during the present winter. It is not necessary to work these plans out in colors, as has been done at times in the past, for it is thought that a plan of one color, inked in, will answer the purpose as well and also save both time and expense.

The properties for which brief working plans have been made are owned and located as follows:—

					Acres.
Mr. S. Mellor, Cummington,					175
Mr. W. A. Barton, Foxborough,					60
Mr. L. T. Reed, Cummington,		•			60
Mr. W. T. Porter, Dover, .					50

There will also be brought together, as soon as time will permit, sufficient data with which to make up a working plan for the Lynn Woods. It is encouraging to state that this wellknown tract of woods, which in the past has been more or less neglected, may and probably will in the near future receive some of the attention so much needed to place the woods in a proper condition. That the Lynn Woods at the present time are in poor shape is evident to the most casual observer. Insect enemies and fires have raised such havoc in them that much of their former value and beauty have been lost. With the exception of a small percentage that has been thinned and sprayed, nearly the entire area is badly in need of immediate Thousands of cords of wood should be removed as soon as possible, especially a large number of such trees as are particularly susceptible to future stripping by moths. Dead and dying wood and much scrub growth should be removed, thereby materially decreasing the fire danger.

It is confidently hoped that the city will place at the disposal of its Lynn Woods commission and water board a sufficient yearly appropriation to permit of the carrying on the needed work along forestry lines which will insure the proper perpetuation of the tree growth.

The needed line of procedure for carrying out such a piece of woods-work has been set forth in two reports from this office and submitted to the chairman of the Lynn Woods commission.

Thinnings. '

Six thinning operations along strict forestry lines have been undertaken the past few months, two of which are about completed. One of these, the W. T. Porter lot in Dover, Mass., containing 50 acres, was stocked with a stand of such nature as to make very careful work necessary in order not to injure much of the young growth. A large part of the area was heavily stocked with white and pitch pine of all ages up to eighty to ninety years, also pasture birch, large red and white oak, maple, ash, chestnut, etc., all growing in a very mixed manner. Since much of the area was badly moth-infested, nearly all of the white oaks were removed. Also all pitch pine and pasture birch were removed from the tract. All told, several thousand feet of white pine, pitch pine and oak were felled, besides about 200 cords of wood.

The logs brought the following prices on the lot: white pine, \$10, pitch pine, \$8 and oak, \$15 per thousand. The cordwood when sold should bring about \$3.50 per cord on the lot. Regardless of the fact that operations were necessarily expensive on account of the badly mixed nature of the growth, it is thought that on the larger part of the tract expenditure and returns will be about even.

Mellor Lot.

Operations of a thinning nature have been started recently on the 175-acre tract of Mr. Alfred Mellor, in Cummington, but will not be completed for some time. The area is stocked with a heavy growth of mixed hardwoods and conifers of good size. There is much to do on this piece of woodland property to place it in the condition desired by the owner. In certain places where trees have been cut and logged by the old methods there are, as is usually the case, quantities of slash left as a breeder for forest fires. Much of this will be cleaned up and burned this winter. The trees on the property are of such size that much of the work to be done in the future should be carried on at a profit to the owner, whose intention it is to do about one-tenth of the work each year. This is probably the first piece of woodland thinning ever carried on in Cummington. It is hoped others will follow Mr. Mellor's lead.

The Barton Lot.

A thinning operation is now being carried on in Foxborough on the 60-acre tract of Mr. W. A. Barton, the tract constituting the woodland surrounding Sunset Lake. This is an operation consisting of the thinning out of about 150 cords of wood in a heavily stocked medium growth of mixed hardwoods and pine. It is thought the cost to the owner will be slight. All of the cordwood has already been sold on the lot.

Taunton Hospital Lot.

The tree growth covering about 50 acres at the Taunton State Hospital has been partly marked for thinnings, and a crew of men are at present engaged in removing the marked trees. This piece of woods is moth-infested and contains a large number of slowly dying trees of good size. It is the intention of Mr. Goss, the superintendent, to gradually underplant the entire thinned area. The small trees needed are to be furnished from the State nursery.

Markings will be completed in the near future over the entire tract, and it is hoped the choppers will have the marked trees cut, slash burned and the area ready for underplanting by the spring of 1914. The choppers are men employed by the institution, and all wood cut is used there.

Reed Lot.

The W. A. Reed property of 60 acres in Cummington, containing a good growth of mixed hardwoods and conifers of various ages, has been marked for heavy thinnings, and the marked trees are to be removed if possible this winter. The cutting and hauling of the logs, of which there will be several thousand feet, will be done by a local contractor. The major part of the lumber will be used by the owner.

A certain portion of the area is open land, and suitable for planting. It is the owner's intention to have this area stocked gradually from year to year, and to carry on all work done under advice from this office.

Greenfield Lot.

The Greenfield Women's Club purchased a tract of land known as Temple Woods on a steep, rocky ledge east of the town for the purpose of preserving the timber thereon, as it is in a region used by the people of Greenfield as a park. The growth is of considerable size and age, and is made up of pine, oak, chestnut, hemlock and hickory. Owing to the thin and rocky soil, and also, in part, to a fire that had been through a portion of the tract some years ago, many of the trees were dead or in poor condition. It was thought best to cut this over-mature growth and thus thin the woods. The chopping was done by our own men, the hauling was let out to a farmer, and the lumber was sold in the log to a mill man in Greenfield. About four acres of open land were planted with young pines, and all slash and brush left after logging were piled and burned. About 50,000 feet of lumber and 35 cords of wood were cut. Owing to the rough and precipitous nature of the land, and the lack of snow during the logging season, the expense of the work was heavy, but the returns about balanced the outlay.

Thinnings on Mountain Tracts.

It is hoped that this year permission can be obtained from the owners of the woodland property, upon which some of the State observation stations are located, to allow a forester from this office to make certain markings of the trees thereon, with the object in view of having the observation men make cuttings during such time as they may have when weather is not suitable for observation work. Such operations would of course be carried on slowly, but much good could be accomplished in time at practically no expense.

There should be many owners desiring to have their wood-lands thinned this coming year. The good accomplished by proper thinnings is very apparent. Fire danger is very materially reduced, while the woods are much more accessible. If infested with moths this danger is lessened, the trees left are in better growing condition, a better stand is assured, and, generally, thinned woods lose little of their value from an æsthetic point of view.

Maps.

There were completed during the past year 24 maps for the use of the State Fire Warden and his observers. Nearly every outlook station in the State was fitted out with a new table map and alidade for use in locating forest fires. These maps consist of the United States government topographical sheets placed together, upon which the town boundary lines were laid out. We are indebted to the Harbor and Land Commission for the use of the town boundary lines obtained by the commission from comparatively recent surveys.

A large line map was also made for use in fire work, and also several maps for the moth department. There is still a good amount of map work to be done as soon as time will permit.

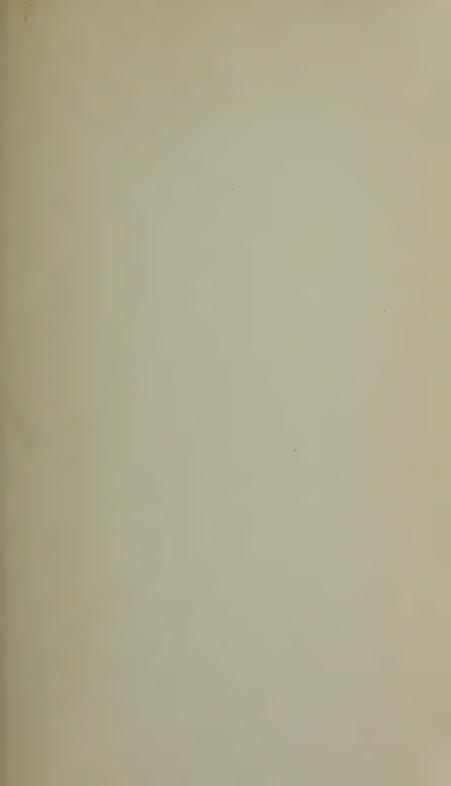
A recent feature in connection with the survey work carried on by this department is the marking of all corners on State lots with a 3-foot section of steel pipe. These pipes and stones make corners that cannot be eliminated or injured by fire, and should last at least fifteen to twenty years. It is very essential that lot corners be so marked that any future trouble may be eliminated. It has been impossible to place these steel corners on any except recently surveyed lots on account of lack of time, but as fast as possible this year the re-marking will be attended to.

A summary of some of the work accomplished by the forest management branch of the department in the past few years is as follows:—

Examinations.			Number.	Area (Acres).	Ex	AMI	NATIO	Number.	Area (Acres).			
1904,				14	2,000	1909,		."			160	15,862
1905,				36	6,545	1910,					49	6,495
1906,				47	9,357	1911,					66	9,694
1907,				37	8,713	1912,					58	5,748
1908,				65	15,842	1913,			2		54	10,250

CHESTNUT BARK DISEASE.

We have been very solicitous in this State as to the effect of this malady upon our chestnut trees during the past few years. The bulletins published by the State Forester have





A mixed mature stand at Norwell, showing white oaks on the right over one hundred years old and white pine trees on the left about fifty years of age. This lot is being operated on account of the gypsy moth infestation. The white pine is worth ten times the oak; further, the pine is resistant in clear stands. This explains why white pine is popular in reforestation.

served to give the information necessary to identify the disease, and as far as we know, what to do for it.

Early last spring I took a trip to Pennsylvania and Washington, D. C., to ascertain the latest information regarding the chestnut bark disease. The State of Pennsylvania has had a special State commission and a large appropriation for this work. The Bureau of Plant Industry of the United States Department of Agriculture has also had an appropriation of \$80,000 a year from Congress, and has had experts in the field. This latter appropriation was made possible through the special interest taken by our Massachusetts senators, Messrs. Crane and Lodge. This trip resulted in my learning the latest methods in Pennsylvania, and in securing an appropriation of \$3,000 from the Bureau of Plant Industry as the government's contribution to the State in attempting some co-operative work.

This season's work was immediately inaugurated, and free assistance and advice were offered to any one in the State having chestnut growth. Mr. Murdoch, one of my assistants who had had previous experience in the work, was put into the field and later we secured the services of Mr. Roy G. Pierce, who has been in our employ since early in July. Mr. Pierce is a graduate of the University of Michigan School of Forestry, and later was connected with the United States Forest Service. Previous to coming to Massachusetts he was employed for a year by the Pennsylvania Blight Commission, coming to us, therefore, well recommended.

Discovery in Massachusetts.

The chestnut blight was not found in Massachusetts until 1909, at which time 4 cases were authentically reported. The evidence found later indicates its presence as early as 1905 or 1906. In the summer of 1911, as reported in our bulletin, it was found in 72 towns. Since that time the blight has been found in at least 200 towns and cities in the State, and it is very probable that it is now in every town and city where chestnut grows to any extent.

Examinations for Blight.

Up to July, 1911, the work consisted mainly of examination of woodlands for individual owners, and of general scouting to

ascertain the prevalence of the disease throughout the State. In 1911, 6 of these special examinations were made for the blight. This was increased to 28 in 1912, on 2,291 acres. During the past year the examinations have been increased by 174 on approximately 8,000 acres of land.

Educational Work.

Since Mr. Pierce's connection with the work we have been able to broaden out along several lines. The educational feature has been emphasized as being a very necessary part in the problem of bringing before our people the methods of handling chestnut woodlands affected by the bark disease.

The State Grange field meetings were attended at Waban, Billerica, Springfield, Greenwich Village, Berkshire Park, Colrain, Athol and Leominster. At each of these summer meetings specimens of the chestnut blight fungus were exhibited, and the manner of spread, the symptoms of the disease and its importance were shown to all those who were interested. The State Forester's bulletin on the "Chestnut Bark Disease" was generally distributed at these meetings.

Three of the largest fairs of the State representing the eastern, middle and western sections were attended, namely, at Brockton, Worcester and Great Barrington. At Brockton and Worcester, through the courtesy of the extension department of the Massachusetts Agricultural College, ample table and wall space was secured for an excellent exhibit of logs from blight-killed chestnut trees, also specimens of bark from thin and thick barked trees, showing the characteristic appearance of the blight canker or blister on the former and the reddish brown pustules of the fungus in the cracks of the latter. Photographs, bulletins and charts were also displayed. Hundreds of wood-lot owners stopped for advice and to ask questions regarding the blight. Mr. Pierce gave a paper before the Massachusetts Tree Wardens' and Foresters' Association in Boston on August 22. Addresses were also given before the granges or local organizations at Montgomery, Blandford, Granville, Palmer and Brimfield, and before two classes at the Framingham Normal School.

Numerous press notices have appeared in the papers regard-

ing the chestnut blight work in the State. Without this help from the press the people could not have been reached in the way they have been. The results of this educational work have been encouraging.

During the season this department has begun some effective forest-mapping work, as noted elsewhere in this report, and this offered an exceptional opportunity to systematically determine the chestnut-blight conditions. A brief description of the infestations as found in the following towns may prove of interest:

Auburn. — The chestnut blight has not made much headway in Auburn as yet. A number of isolated cases were found, but nothing threatening great damage at present.

Blackstone. — The per cent. of timber land covered with chestnut comprises at least one-half of the total, and probably two-thirds has some chestnut on it. The bark disease, although present in nearly all extensive stands of chestnut, seldom exceeds one affected tree per acre. West of the Mendon Road, near the Mendon-Blackstone line and in the extreme north-western corner of the town, are large tracts with 5 or more infections per acre, these being the worst cases of the disease in the town.

Douglas. — Chestnut bark disease scattered. Only individual trees attacked throughout the town. More prevalent in northern half, and usually among smaller growth. Chiefly noticeable around East Douglas.

Dudley. — In the timber along the western part of the town the chestnut bark disease occurs, but not very widely distributed. In young sprout stands, of which there are large areas, it is practically everywhere. There is very little evidence of its presence in the larger chestnut area in the eastern part of the town.

Grafton. — Chestnut constitutes practically 70 per cent. of the woods. Blight infections in stands 10 inches and over in diameter will not average more than 2 or 3 to the acre. Some of the stands are entirely free from it. In young sprout areas the disease is spread much more, in most cases about 10 to 15 young trees to the acre being infected. Some 200 acres of young sprout land, north of Goddard Pord, between the rail-

road and the road to the north, is pretty generally infected. The disease is found throughout the entire town, but is far more prevalent on the younger trees.

Northbridge. — The chestnut blight has badly infected young chestnut sprout lands, much of which occurs in this town. Almost every plot of young chestnut contains infected trees. In the western part of the town, in the woods of larger trees, the blight is not very prevalent. It occurs scatteringly in practically all chestnut woods in the eastern part of the town.

Sutton. — The chestnut blight occurs practically everywhere in the young sprout lands. The older trees as yet do not show the effects. In one place, situated about midway up the eastern boundary of the town it has killed every tree, and at present is spreading fast in all directions.

This chestnut bark disease work the State Forester has organized for purposes of economic effectiveness, as follows: The assistant in immediate charge, who is an expert, is given a definite policy to carry out. The expert, Mr. Pierce in this case, is then authorized to enlist the assistance of the regular staff of this organization as a large auxiliary body of men to report their observations as they travel about the State. This necessitates the acquaintance of the men with the disease. Co-operation in this way increases the amount of good the department may do; also broadens and develops our employees for greater usefulness.

Besides the assistants and division men, forest wardens, moth superintendents and patrolmen are all included.

Recommendations.

Studies made throughout the State show that the younger thin-barked chestnut sprouts have become affected by the chestnut bark disease to a much higher per cent. than older stands of thick-barked trees; that is, while the younger trees are often infected from 25 to 100 per cent., the older trees near by would show infection from only 1 to 10 per cent.

While it is possible by removal of blight cankers and diseased limbs on valuable lawn and park trees, or on grafted nut trees, to prolong the life of chestnut trees affected by the bark disease, yet this sort of treatment is not applicable to forest trees. Wherever the chestnut blight has affected the trees in the forest, the only treatment possible to check the disease is the prompt removal of the infected trees. This is specially advised where the diseased trees are large enough to produce valuable products, as poles, ties, posts and cordwood.

The removal of all near-by sources of infection will render the timber less liable to be infected in the future, since the blight seems to spread faster from local centers to near-by trees than to trees at a distance.

Better forest practice is needed in combating this disease. The general practice has been to clean-cut the chestnut and oak stands in southern New England without intermediate thinnings. This has often been wasteful. The trees which make up the dominant growth in forty or fifty year old stands have had to fight for light, food and moisture at the expense of the weaker trees. Proper thinnings would tend to reduce the fierce competition, give an intermediate yield, as well as cut down the time at which the trees would reach a merchantable size. The experiments of European foresters have shown that the rotation of the timber crop can be shortened by judicious thinnings from 10 to 20 per cent.

Since it seems that the smaller chestnut trees in Massachusetts are liable to be infected by the chestnut bark fungus to a greater extent than larger trees, it may be concluded that the faster the small trees can be made to grow, the quicker will they become more resistant to the disease. The rate of diameter growth may be very materially increased by proper thinnings.

As heretofore, this department stands ready to advise any owners of chestnut growth, as to its present and future management, at no expense. It is more satisfactory to both parties where the owner goes over the woodlands personally with the expert. For examinations, make application to this office.

REPORT OF THE STATE FIRE WARDEN.

Mr. F. W. RANE, State Forester.

Sir: — In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year: —

The same division of the State has been continued again this year as follows: District No. 1, Essex, Middlesex and Norfolk counties; District

No. 2, Barnstable, Bristol and Plymouth counties; District No. 3, Worcester County and west to the Connecticut River; District No. 4, Berkshire County and east to the Connecticut River. Each district is under the supervision of a district forest warden. Two changes have been made in the personnel of the district forest wardens. Mr. James E. Moloy, who has had supervision of District No. 1, was made inspector of locomotives, being succeeded by Mr. Oscar L. Noyes. Mr. Albert R. Ordway has been appointed district warden of the 4th district to succeed Mr. Frank L. Haynes, who has been promoted to the position of assistant forester, assisting in the forest management work.

The district forest wardens have full supervision of the work in their districts, being in charge of the several observation stations, as well as constructing telephone lines, erecting steel towers, map-making, visiting each town and consulting with the selectmen and town forest wardens and deputies relative to the need of additional equipment for handling fires, and perfecting better forest fire-fighting organizations. This may seem a very easy matter, but when we take into consideration that we have 354 towns and cities, and that the matter of purchasing equipment must be brought before the citizens at their annual or special town meetings, it means an immense amount of work.

In the work of perfecting town forest fire-fighting organizations we have been handicapped owing to the appointment of 354 town and city forest wardens being made by the selectmen of as many towns, this department simply having the approval of them. The result is that we still have inefficient men in some towns, — men who are not interested in the preservation of the forests and who know little, if anything, about handling forest fires. This should be remedied by these appointments being made by this department, thus making the department responsible for the results. We should then have efficient men in every town.

We have had in operation this year 21 observation stations reporting to the town forest wardens 3,238 fires.

District No. 1.— In addition to the four observation towers already established in this district we have erected and equipped two 40-foot steel towers. One of these is located in the town of Essex on Morse Hill, which covers all of Cape Ann, as well as all the valuable timber land along the North Shore. We are deeply indebted to Col. Wm. D. Schier, chairman of the North Shore summer residents committee, for his liberal contribution of \$900 toward the tower and 7 acres of land which were acquired and donated to the Commonwealth. This tower was completed April 24 and used throughout the season. The second tower was built on Hart Hill in the town of Wakefield, this hill being a part of the city reservation and making an ideal location for a tower. The town of Wakefield contributed \$350 toward this tower.

It is very important that a tower be placed on Nobscot Hill in the town of Framingham during the coming year, in order to assist several towns that are now receiving no protection. These unprotected towns will

contribute liberally toward such a tower, which will complete the observation system in District No. 1.

District No. 2. — Two new 40-foot towers have been established in this district, one at North Hanson and one at Bournedale. The North Hanson tower is located on Bonney Hill and commands an excellent view. The towns of Duxbury, Hanson, Hanover, Halifax, Pembroke, Plympton, Marshfield and Whitman contributed \$725 toward the purchase of this tower. The Bournedale tower, located near the Bourne and Plymouth line, covers a large tract of valuable forest land, as well as many acres of burned-over areas in the towns of Bourne and Sandwich. The towns of Bourne and Wareham contributed \$450 toward the erection of this tower. This burned area should be reforested, and with the protection derived from this tower and the hearty co-operation of the citizens of these towns, there should be very little danger of any such fire as experienced there this year.

Three other stations should be established in this district in order to completely cover it, located at Falmouth, Harwich and Fall River. The officials of these towns have expressed a desire to contribute very liberally if towers are located there. It is expected that the citizens of Barnstable and Yarmouth will purchase a new steel tower to replace the old wooden one now in use at Shoot Flying Hill. Owing to the unsafe condition of the old tower during heavy winds that prevail in that locality, and to the many visitors who frequent this tower, it is extremely necessary that a new tower be erected. The citizens of Middleborough, Lakeville and Carver are contemplating the establishment of a tower on Bardons Hill in Middleborough, which will cover these towns as well as other surrounding towns. We have used the town hall at Middleborough this year, but have not been able to obtain nearly as good results as would have been obtained from Bardons Hill. With these extra towers we shall be able to protect all the forest area in this district.

District No. 3. — Two temporary stations have been added in this district this year, — one on little Muggett Hill in Charlton, which was used two months during the spring, and one on Lincoln Mountain, in Pelham. An old wooden tower was repaired and used at this latter station throughout the season. Several influential citizens of Amherst and surrounding towns have signified their desire to contribute liberally toward installing a steel tower at this point. It is necessary that the northern and southern portions of this district be better protected by the addition of at least two more stations, but as no co-operative agreement is in operation between this State and the States of New Hampshire and Connecticut, it is not advisable to erect such towers until some satisfactory agreement can be reached relative to the proportionate charge for maintenance to be paid by the above States.

District No. 4. — Owing to the discontinuance of the use of Greylock Mountain as an observation station, it has been necessary to build a temporary tower in the trees on Tower Mountain in Savoy, which was

used a portion of the season. It is necessary that three new stations be established in this district along the boundary lines of Vermont, New York and Connecticut, but the same consideration arises as to the future maintenance as in District No. 3. It is hoped that some definite agreement may be reached at once with the federal department and with adjoining States which will permit the establishing of these stations, thereby completing our observation system.

Owing to the large number of people visiting our observation stations it has been found advisable, from an educational standpoint, to provide better means for reaching the observation rooms, so that they may be made accessible to women and elderly people. With this point in view, and with the generous contributions made by the different towns, we have equipped all our towers purchased this year with spiral or fire-escape stairs, with two landings before reaching the top. From the reports received from our observers it is surprising to note that we have had nearly 3,000 people visit our towers this season, representing nearly every State in the Union and many of the foreign countries.

FOREST FIRE EQUIPMENT.

Under an act of the Legislature passed in the spring of 1910, appropriating \$5,000 annually for forest fire protection, towns with a valuation of \$1,500,000 or less are entitled to 50 per cent. reimbursement on all forest fire-fighting equipment they desire to purchase not exceeding \$500, no town being allowed an amount exceeding \$250. All forest fire equipment purchased under this act is approved by this department and placed under the supervision of the town forest warden, subject to inspection at all times by the State Fire Warden or the district forest wardens.

We have at the present time 156 towns coming within the provisions of this act, and during the four years it has been in operation 108 towns have taken advantage of it. This year 53 towns have exhausted the appropriation. Until this year it has been extremely difficult to impress upon the citizens of the central and western parts of the State the importance of providing their towns with proper equipment, but of this year's appropriation, over \$3,000 was expended in Districts Nos. 3 and 4. The style of equipment desired varies in the different parts of the State. Throughout the eastern part fire extinguishers work to exceptionally good advantage in checking any ordinary fire, but in the western hilly country it is extremely difficult to convince the public that they can be used to good advantage at such fires, many preferring the old method of using shovels and dirt. These towns expend very little money for equipment of any nature; consequently, out of 56 towns west of the Connecticut River that are entitled to reimbursement but 18 have taken advantage of the act.

There are at the present time 198 towns whose valuation exceeds \$1,500,000, and that are, therefore, not entitled to reimbursement. Sev-

eral of these towns have purchased equipment this year, thereby better protecting themselves from the ravages of the fire evil. In 1910, when the reimbursement law was enacted, there were 178 towns coming under the act. During the past four years the valuation of 22 of them has increased so that it now exceeds \$1,500,000, and they are no longer entitled to reimbursement. Owing to no special effort being made by this department along this line until the past two years, it seems but fair that the law be amended, making the valuation limit \$1,750,000, thereby allowing these 22 towns to take advantage of the act. The following tables on pages 69 to 72, show, first, an itemized statement of the equipment purchased since the enactment of the law and the amount received by each town from the Commonwealth during that period; second, a list of the towns having purchased equipment this year and the amount of reimbursement received by them. This department holds receipts from the town forest wardens for all equipment purchased under the act.

RAILROAD FIRES.

The railroad fire situation is gradually improving, but owing to the fact that there are over 2,000 locomotives, and over 2,500 miles of right of way within this State, it is very evident that a vast amount of work must be done to eliminate railroad fires. In addition to the above we have the many miles of slash accumulation adjoining the right of way where owners seem indifferent, preferring in many instances to allow the burning of it by sparks from locomotives, whereby they may get a fair revenue in the form of damage claims, rather than to dispose of it themselves and thereby eliminate the danger of fires during severe drought.

Through the courtesy of the Board of Railroad Commissioners and the consent of the railroad officials this department has been able to maintain a system of locomotive inspections, one inspector being detailed on this line of work and vested with authority to inspect the spark arresters and ash pans of locomotives in operation throughout the State. In addition to this, the New York Conservation Commission has inspected all locomotives running into New York State, thus improving the condition of locomotives used in the western part of Massachusetts. Our records show that 1,105 locomotives were inspected, of which 26 per cent. of the Boston & Albany locomotives, 23 per cent. of the Boston & Maine locomotives, and 49 per cent. of the New York, New Haven & Hartford locomotives were defective. A large percentage of the defective locomotives were found in the early part of the season. As the season advanced, and extra men were assigned to repairing the defects and installing new screens where necessary, inspections showed a very decided improvement, very few defective locomotives being found. As this inspection work is most important, it is necessary that at least one more inspector be employed this coming season.

Mr. E. A. Ryder, who has charge of the fire prevention department of

the Boston & Maine Railroad, is certainly deserving of a great deal of credit for his excellent record in reducing the fire claims of that road in the past two years. From a loss of \$200,000 in 1911 to one of less than \$50,000 this year is certainly very commendable, especially so when we take into consideration the continuous drought that was experienced in this State this year, producing a condition for fires almost unprecedented. In order that still better results may be obtained, this road is equipping all locomotives running over the Central Massachusetts division with the Mudge-Slater spark arrester, a device which has been used with great success on the Chicago & Northwestern Railroad in the west and on the Maine Central Railroad in the east. They are also to maintain a patrol service along dangerous sections, patrolmen being provided with gasoline speeder cars which will accommodate two men and the necessary equipment for their use.

The results accomplished by the New York, New Haven & Hartford Railroad have not been as satisfactory as was desired. Little attention was paid to defective spark arresters until the matter was called to the attention of the vice-president of the road, showing the vast amount of money expended by the road for settling fire claims and extinguishing fires, and that little or nothing was being done to remedy the cause of these fires. Orders were at once issued requiring that special attention be paid to all spark arresters and ash pans, and inspections made late in the season showed a very decided improvement.

Our railroad fire reports show that we have had 913 railroad fires, as follows: Central Vermont, 65; Boston & Albany, 151; Boston & Maine, 232; New York, New Haven & Hartford, 465; burning over an area of 16,620 acres, with a cost to extinguish of \$8,930 and a damage of \$64,222.

Owing to the large number of fires throughout the Cape country, the greater per cent. of which were caused by locomotives, the Public Service Commission was petitioned, under date of August 19, as follows:—

To the Public Service Commission:

Respectfully represents F. William Rane, as he is State Forester, that in that part of the Commonwealth comprising Barnstable County there have been for many years past a very large number of fires set in the grass lands and woodlands by sparks from locomotives operated by the New York, New Haven & Hartford Railroad Company; that many of these fires have burned over large areas of woodlands and destroyed large quantities of wood, both cut wood and standing wood, and fires spreading from these fires in the woodlands have burned and destroyed dwellings and other buildings; that many complaints from private citizens residing in the different villages and towns in said county have been made to him, as State Forester, all calling attention to the large number of fires that have been set by sparks from locomotives; that your petitioner has repeatedly called the attention of the officials of said railroad to the above conditions, and said officials have, by the installation of spark arresters on the locomotives, and by clearing up and burning the grass within the locations, sought to prevent the escape of sparks from the locomotives and the starting of fires, but the number of fires has increased rather than decreased; that a careful investigation has been made and the following appear to be the conditions throughout the entire county, from Buzzards Bay to Prov-

incetown, from Buzzards Bay to Woods Hole, from Yarmouth to Hyannis, and from Harwich to Chatham, to wit: there is only a single track on the main line and the above branches, with sidings at the different stations; that the roadbed over its entire length is of very uneven and varying grades; that there are operated daily a large number of trains, both freight and passenger; that because of said different grades, and because of there being but a single track, there is necessity of making the schedules so that the trains may meet and pass at the meeting points; that the locomotives of necessity in many instances have to be run at forced draft, and therefore many sparks are emitted from them and many fires are thereby set; that during the past summer months a very large number of fires have occurred, and reports and complaints are being daily received by the State Forester of the numerous fires that are being set, both within and adjoining the railroad location, by sparks from the locomotives, which fires spread over the adjoining lands of private owners; that in consequence of these many fires many of the communities are in comparative fear of fires and of the damage resulting from them; that while the number of fires has been very great during the immediate past two months, owing probably to the unusual dryness of vegetation, yet during all the year, when conditions are normal, an unusually large number of fires are set in this county by sparks from locomotives; that the railroad company has made an effort to reduce the number of fires by clearing up its right of way and by equipping engines with spark arresters, but the dryness of the vegetation and the unevenness of the roadbed, requiring heavy firing of the locomotives at many parts of the system in this county, has resulted in causing a large number of fires to be set (for example, it is reported from the village of Barnstable that in a distance of less than 2 miles 11 fires were started on Saturday, August 16, an actual count of burned places within and just outside the railroad location, between the railroad stations at West Barnstable and Barnstable, a distance of 4 miles, shows that a total number of 70 fires have already been set during the present summer, and a casual observation while riding on the train shows that a very large number of fires have been set within and adjoining the railroad location throughout the whole length of the line in said county); that your petitioner, in his capacity as State Forester, acting under the authority of acts of the different Legislatures, has been for several years establishing nurseries and plantations in different parts of the Commonwealth for the growing of trees, and has set out in various parts of Barnstable County plantations of trees, all of which is being done both to create a new growth of trees and also to encourage among private individuals the further growth of timber growing within the Commonwealth and in that county; that in consequence of the many fires which have been set by sparks from locomotives and from other causes, the nurseries and plantations of trees have been seriously menaced; that further introduction has been retarded and private individuals have hesitated to engage in forestry work; that a careful investigation of the conditions has convinced your petitioner that the only remedy for preventing the setting of the large number of fires is by a change of means of operating the engines of the New York, New Haven & Hartford Railroad Company from the present coal-burning fuel engines to either the electrification of that part of the New York, New Haven & Hartford Railroad system which it operates in Barnstable County, or by equipping the present engines, now equipped to burn coal only, with such devices as will allow the burning of oil; that the electrification of that part of the line of said railroad, while it would permanently prevent a recurrence of the present conditions, yet seems to be impracticable at the present time because of the cost of installing such a system; that the use of oil-burning engines in other parts of the United States, where railroad locations run through forest and woodlands, has shown that the use of such oil-burning engines has resulted in practically an entire stopping of

Wherefore, your petitioner respectfully prays that your honorable board may determine that only engines equipped with oil-burning devices shall be operated

by said railroad company in Barnstable County, and will make an order requiring said railroad company to forthwith so equip its engines for use in said county with oil-burning devices, and operate only such engines in said county.

In response to the above petition the following order was issued: —

It is

Ordered, That a copy of this petition be sent to the New York, New Haven & Hartford Railroad Company with the request that it make report as to the feasibility of substituting oil for coal, particularly in the Cape district; also as to the comparative cost of the two methods of supplying fuel for the engines, including also consideration of economics by reason of saving in damage claims for forest fires set.

It is further

Ordered, That the petition stand for public hearing on Sept. 22, 1913, at 10.30 o'clock in the forenoon, to be duly advertised.

Attest:

(Signed) ALLAN BROOKS,
Assistant Secretary.

The State Forester's department was represented at this hearing by Deputy Attorney-General Henry M. Hutchings, acting attorney for this department. Nearly 100 residents and property owners residing in Barnstable County were in attendance, including the Hon. Thos. C. Thatcher, who made the trip from Washington especially to be heard on this matter, Wm. C. Adams, representing the Fish and Game Commission, Chas. C. Craig, representing boards of trade of Falmouth and Cape Cod, delegates from many granges, and members of the boards of selectmen of every town in Barnstable County. A whole day was devoted to the discussion, at the conclusion of which the chairman of the Public Service Commission stated publicly that it had been proven to the satisfaction of the commission that the forest-fire situation along the railroad was critical. At the conclusion of the hearing a statement was filed with the railroad requiring certain information relative to the present operating expenses of the road within Barnstable County. Upon receipt of this information a second hearing is to be called at which expert testimony will be introduced showing the approximate cost of burning oil as compared with the present expense of operation.

RURAL MAIL CARRIERS.

The results obtained from the co-operation with the 300 rural mail carriers within the State were not as satisfactory as we had expected, this being undoubtedly due to the fact that this department is not in direct touch with the carriers, all instructions from this office being submitted to the postmasters. During the last of the season we deviated somewhat from this plan and requested our district wardens to personally call on the carriers, whenever an opportunity presented itself, and interest them in this line of work. These interviews have already shown results, and I feel that when we are able to get in touch with all the carriers greatly improved results will be shown. Our reports from the postmasters show

that 144 fires were reported by the carriers during the year. This number would undoubtedly have been very materially increased if reports had been received direct from the carriers.

FEDERAL CO-OPERATION.

The Weeks bill passed in 1910, providing for the purchase of portions of the White Mountain and Appalachian Mountain regions, also provides for the protection against fires of watersheds of navigable streams in the United States. The co-operative work in this State is confined to the watersheds of the Nashua, Chicopee, Miller, Thames, Blackstone, Hudson, Connecticut and Deerfield rivers, and an allotment of \$3,000 was made by the federal department for carrying on the work within these watersheds. This fund was used for the payment of observers in the various observation towers throughout the central and western parts of the State. This appropriation has made it possible to better protect the above watersheds than would have been possible under our limited State appropriation.

DANGER FROM SLASH.

The greatest fire evil this department has to contend with is the slash problem. It is impossible even to give an estimate of the number of the thousands of acres of slash there are left upon the ground throughout the State at the present time, but some idea may be reached when we take into consideration that there are 297 portable sawmills in operation, and in only 12 instances has there been any disposition made of the slash. We also have over 300 miles of power line, a large percentage of which runs through forest lands. These lines are cut, in most instances, 150 feet wide, and in nearly every case the slash is piled against the adjoining forest area. These power lines would make excellent fire lines, provided they were cleaned and the brush disposed of.

Then we have the many miles of highway where not only do we have the accumulation of slash on property adjoining the highway, but the land within the road limits is not cleaned in many instances. If this were cleaned the many fires starting from automobile parties and others carelessly throwing lighted matches, cigars and cigarettes along the roadside would be lessened very materially. The time is certainly at hand when legislation should be enacted that will improve the slash conditions throughout the State and put a stop to the enormous damage from fires from this cause.

Boy Scouts.

The following communication from Scout Commissioner Ormond E. Loomis of the Greater Boston District gives a very good idea of the interest shown by the Boy Scout organization in the prevention of forest fires.

Mr. M. C. HUTCHINS, State Fire Warden, 6 Beacon Street, Boston, Mass.

DEAR SIR: — Complying with your request that we submit a report showing to what extent the Boy Scouts in Massachusetts have benefited the State by

checking or stopping forest or brush fires, I am glad to send you herewith the very meager information given me. This is accurate for Greater Boston alone, as our office has supervision only over scouts in the towns of Greater Boston, that is, those in towns within a 10-mile radius of the State House.

Scouts in this territory have discovered and reported many small brush fires in sections of our State reserve and in large wooded estates in the vicinity of Boston, especially in Milton, Quincy and Braintree districts and the Waltham, Medford, Lexington and Wakefield districts. Through your State officials and fire wardens in the various outlying districts you have doubtless already heard of the work done near Falmouth, Gardner and Fitchburg, and that done out in the Berkshire Hills. Of these I have only the general newspaper reports.

Special groups of scouts in smaller towns have patrolled dangerous sections near railroad tracks during the extra dry season of the summer. They were probably instrumental in locating several small fires that might have been seriously damaging, but it is difficult to say accurately just how much value their services were. Numerous instances have come to my attention in which boys have stopped grass fires, but in most cases these were considered by them so unimportant that no special reports were made.

It is my belief that much more has been done during the year in the way of prevention than by actual work in stopping fires already started. The bulletins furnished by you to our scout officials have done more than any other one thing to instruct them as to what the law in Massachusetts, regarding the lighting of fires, is, and to indicate to them what they should do whenever they observe a fire. The information contained in the pamphlet has been freely disseminated so that scouts also are now fairly well informed as to what they should and should not do when traveling afield. Perhaps it is safe to assume that their knowledge and caution has had a good influence on others who might have committed offences and upon those who, because of lassitude or indifference, were slow to inform the State authorities that offences were being committed.

In the interests of further safety and instruction I should like very much to have a new supply of pamphlets to distribute to those who have become scout masters since your first distribution of the information bulletins.

Appreciating your kindly interest in the work of the scouts and your desire to educate them in their duties as future citizens of the Commonwealth, I am

Sincerely yours,

ORMOND E. LOOMIS, Scout Commissioner.



INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT.

Town.	Ахев.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reim- burse- ment.
Acushnet,	1	10	16	-	-	-	4	1	-	-	-	11	\$143 22
Ashburnham, .	-	-	8	-	1 -	-	-	-	Н	-	-	-	25 00
Ashby,	-	-	12	-	-	-	-	-	-	-	-	-	34 50
Ashfield,	-	-	33	1	1-	-	-	-	-	-	-	-	99 00
Ashland,	-	6	10	-	-	-	12	6	-	6	12	-	77 31
Auburn,	H	-	83	-	1-1	-	-	-	-	-	-	-	249 00
Avon,	-	10	-		-	-	12	-	Н		-	-	9 90
Becket,	-	4	6	-	-	-	-	-	-	-	12	-	28 25
Bedford,	1	14	24	-	-	-	-	-	-	-	-	12	249 67
Belchertown, .	-	-	39		1-	-	-	1 -	-	-	-	-	171 62
Bellingham,	-	16	20	-	1-	-	6	~	-	8	-	11	113 17
Berkley,	-	_	24	_	1-1	-		-		-	-	-	144 00
Berlin,	2	10	38	-	_	1	12		3	12	-	11	241 45
Blandford,	-	1	16	-	-	_	-			-	-	-	59 80
Bolton,	-	14	12	_	-	-	6			6	-	-	58 40
Boxborough, .	1	-	30	-		2	-		3	4	Ы	11	180 46
Boxford,	-	-	16	-	-		-	-	-	-	-	-	45 60
Boylston,	-	_	24	-	-	-	-	-	-	_		-	76 20
Brimfield,	-	10	30		П	-	-	-	-	_	_	_	99 75
Burlington,	_	II-I	20	-	-	1-1	-		-	-	_	_	100 00
Carlisle,	2	15	18	-	2	-	6		1	6	_	12	247 72
Charlton,	-	_	68	-	_		40		-	60	_	-	221 37
Chatham,	2	15	10	-	2	3	4	_	3	5	-	11	152 98
Chesterfield,	-	-	25	_	_	-	_	-	-	_	-	_	75 00
Dana,	_	_	6		_	_	_	-	-	_	_	-	18 75
Dighton,	2	8	18	_	1		_	_	2	2	_	11	108 67
Douglas,	_	25	50	-	_		-	_	_	_	_	_	175 00
Dunstable,	2	25	10	_	1	_	4	-	3	- 6	Б	11	106 14
East Longmeadow,	2	_	18	_	2	_	12	_	-	4	_	11	149 71
Erving,	_	_	25	30	-	-	_	-	_	18	-	_	86 52
Freetown,	-	24	20	-	-	_	-	2	_	72	_	-	166 58
Georgetown,	_	20	36	_	-	_	_	_	6	12	-	_	134 83
Gill,		5	20	_	_	_	_	_	_	-	_	_	65 00
Goshen,			25									_	121 73

¹ One-horse.

² Two-horse.

Inventory of Equipment purchased under the Reimbursement Act—Continued.

Granby, Granville, Greenwich,	Ахөз.	Cans.	Extinguishers.	Hoes.	Lanterns.	ks.					Brooms.		Dai
Granville,	-			H	Lant	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Bro	Wagons.	Reim- burse- ment.
	_		12	-	_	-	-	-	-	-	_	-	\$39 00
Greenwich.		_	-	-	_	-	_	-	_	_	-	21	130 00
Oldoon in tony	-	_	18	-	_	_	_	_	-	-	-	-	60 45
Groveland,	-	6	12	-	_	-	-	-	3	12	-	-	51 05
Hadley,	-	-	15	_	-	-	-	-	-	-	-	-	75 00
Halifax,	-	12	64	-	_	-	12	_	-	18	-	-	241 91
Hanson,	-	6	24	-	в	-	6	-	-	5	-	13	250 00
Harvard,	2	7	14	-	2	3	-	-	3	12	-	12	201 52
Holbrook,	-	12	10	-	-		_	-	-	-	-	-	69 00
Hubbardston, .	-	-	52	~	-	-	18	-	-	4	-	-	175 75
Leverett,	2	20	16	8	2	4	-	2	4	8	-	21	160 17
Lunenburg,	2	12	10	_	2	3	4	-	3	5	-	11	149 28
Lynnfield,	-	10	20	-	-	-		10	-	-	-	21	246 25
Mashpee,	-	-	22	-	-	-	-	-	-	12	-	-	74 80
Mendon,	-	-	15	-	-	-	-	-	-	-		-	90 00
Merrimac,	-	-	15	-	-	-	-	-	-	-	-	-	75 00
Middleton,	-	-	16	-	-	-	-	-	-		-	-	49 50
Millis,	-	-	8	-	-	-	-	-	-	-	-	12	242 00
New Braintree, .	-	-	25	-	-		-	-	-	-	-	-	18 15
New Salem,	-	55	20	-	-	-	_	-	-	-	-	-	100 50
Newbury,	-	-	6	-	-	-	-	-	-	-	-	-	18 15
Norfolk,	-	-	18		-	-	-	-	-	-	-		99 00
North Reading, .	-	-	24	-	-	-	-	-	-	-	-	11	248 43
Northborough, .	-	-	25	-	-	-	-	-	-	-	-	-	102 37
Norwell,	-	-	32	-	-	-	12	-	-	-	-	11	243 87
Oakham,	-	12	24	-	1	1	2	-	3	3	-	11	190 85
Otis,	-	-	10	-	-	-	-	-	-	-	-	-	60 00
Paxton,	3		28	12	-	-	-	-	-	6	-	-	105 87
Pelham,	-	-	19	-	-	~	-	1	-	-	-	-	76 62
Pembroke,	-	-	31	-	-	-	60	-	-	-	-	12	250 00
Petersham,	2	10	22	-	-	3	4	-	3	5	-	11	202 55
Phillipston,	-	6	14	-	-	-	-	-	-	-	-	-	48 65
Plainville,	2	10	10	-	2	3	4	-	3	5	12	11	183 50

¹ One-horse.

² Two-horse.

³ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT — Continued.

				ACT		Onti	1000	•					
Town.	Ахев.	Cans.	Extinguishors.	Ноез.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reim- burse- ment.
Plympton,	_	-	_		_	-	_	12	_	_	-	-	\$20 93
Prescott,	_	_	10	-	-	-	-	-	_	-	_	-	48 16
Princeton,	-	32	80	-	_	-	-	-	-	-	-	-	249 20
Raynham,	3	46	30	_	6	-	12	-	9	15	-	3 1	222 23
Rehoboth,	_	10	48	-	-	-		-	-	-	_	11	250 00
Richmond,	-	15	25	-	_	-	4	-	1 -1		_	-	86 20
Rochester,	_	24	60	-	-	-	-	-	-	30	-	-	205 37
Royalston, .	3	10	22	30	2	2	12	Ш	II -	42	_	11	145 10
Russell,	-	7	39	-	-	-		-	_	-	-	11	220 25
Rutland	-	12	18	-	-	-	6			_	-	13	250 00
Salisbury,	3	-	9	-	6	-	24	-	-	6	-	-	36 87
Sandwich,	22	12	36	-	-	2	-	-		24	-	11	245 60
Shelburne,	-	-	50	-	~	-	-		12	n	-	11	186 87
Shirley,	_	48	36	-	_	-	-		-	_		-	139 50
Shutesbury,	-	16	25	_	_	-	-	-	-	[_ I	I -	-	87 50
Southwick,	_	12	20	-	_	-	-	II-I	-	-		11	82 00
Sterling,] _	-	25		-	_	-	-	II-I	-	18	12	241 12
Stow,	-	-	42		_	-	-	-	-	18	-	_	131 31
Sturbridge,	1 -	11	35	-	-	-	-		-	-	-	-	116 45
Sudbury,	-	-	40		-	-	-		L	-	-	-	250 00
Sutton,	-	50	50	24	-	_	-		32	24	-	_	188 46
Tewksbury,	2	-	24		2	-	-	-	-	30		- 12	174 00
Townsend,	-	-	46		-		-	-	-	-		-	250 00
Tyngsborough, .	-	120	20	_	-		-	30	12	24	-	-	189 80
Tyringham,	2	10	10	-	2	1	10		2	3	-	12	112 30
Upton,	-	-	30	-	_	-	-	-	-	-	12	11	235 28
Wales,	2	10	40		2	2	-		-	-	-	11	236 77
Warwick,	-	H	10	-	-	-	_	-	-	-	-	11	154 35
Washington,	-	-	4	-	_	-	~	-	-	-	-	-)	20 00
Wendell,	-	-	8	-	-	-	-	-	-	12	-	-	35 07
West Boylston, .	-	-	107	-	-	-	-	-	-	-	-	-	250 00
West Bridgewater,	-	-	20	-	-	- }	-	-	-	-	-	11	200 12
West Brookfield, .	-	12	37	-	-	- 1	-	-	_	-	-	-	121 75
	1												

¹ One-horse.

² Two-horse.

³ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT—Concluded.

Town.	Area.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reim- burse- ment.
Westhampton,	-	-	16	-	-	-	~	-	-	-	-	-	\$48 00
Westminster,	-	52	48	24	-	-	24	-	-	24	-	-	242 22
West Newbury,	-	10	6	-	-	-	-	-		-	-	-	33 75
Wilbraham, .	-	27	32	-	-	-	23	-	12	6	-	-	118 38
Wilmington, .	-	12	40	-	1	-	-	18	-	34	-	-	187 33
Windsor, .	-	-	30	-	-	-	-	-	-	-	-	-	150 00
Worthington,	2	15	10	-	-	3	-	-	-	5	-	11	.86 01
Wrentham, .	-	12	12	-	4	-	-	-	-	-	-	11	210 10
Totals, .	69	1,001	2,711	128	50	33	355	82	122	619	72	45	\$14,884 61

¹ One-horse.

Towns receiving Fire-equipment Reimbursement during Year 1913.

				-	
Ashburnham, .		•	\$25 00	Paxton,	. \$105 87
Ashfield,	•	•	99 00	Pembroke,	. 46 25
Ashland,			34 04	Plainville,	. 5 00
Auburn,			39 00	Plympton,	. 20 93
Becket,			28 25	Richmond,	. 30 00
Belchertown, .			100 00	Rochester,	. 205 37
Bellingham, .			45 95	Royalston,	. 24 50
Boxborough, .			90 46	Russell,	. 220 25
Burlington, .			100 00	Salisbury,	. 38 87
Carlisle,			54 00	Shelburne,	. 182 50
Chesterfield, .			75 00	Southwick,	. 82 00
Dana,			18 75	Sterling,	. 9 37
Douglas,			175 00	Townsend,	. 250 00
Dunstable, .			106 14	Tyringham,	. 112 30
East Longmeadov	∇, .		149 71	Upton,	. 106 75
Freetown, .			94 86	Warwick,	. 154 35
Georgetown, .			36 00	Washington,	. 20 00
Goshen,			121 73	West Boylston,	. 250 00
Granby,			39 00	West Brookfield,	. 121 75
Granville, .			130 00	Westhampton,	. 48 00
Halifax,			36 00	Worthington,	. 86 01
Hubbardston, .			175 75		
Leverett,			160 17	Total,	. \$5,012 48
Lynnfield, .			160 00	Unexpended balance, .	. 5 45
Mashpee,			40 25		
Mendon,			90 00		\$5,017 93
Millis,			242 00		
New Salem, .			100 50	Appropriation,	. \$5,000 00
Norfolk,			99 00	Credit by town of Wilbraham,	. 17 93
North Reading.			114 00		
Oakham,		Ċ	52 85		\$5,017 93
Otis,			60 00		

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST FIVE YEARS.

	YE	AR.		Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1909,				1,496	35,083	_	\$189,482	23.45	\$126 66
1910,				1,385	42,221	\$23,475	205,383	30.46	148 29
1911,				2,536	99,693	47,093	537,749	39.31	226 24
1912,				1,851	22,072	20,219	80,834	11.92	43 67
1913,				2,688	53,826	35,456	178,357	20.02	66 35

Forest Fires of 1913.

	1	Mon	HS.			Acres.	Damage.	Cost to extinguish.	Number.
December,		191				731	\$281	\$354	93
January,		191	3.			43	15	44	21
February,					.	62	57	118	38
March,						1,351	2,896	1,133	317
April, .					.	8,385	14,525	5,686	580
Мау, .						21,325	93,345	9,878	684
June, .						5,092	25,894	2,835	255
July, .					.	14,113	35,050	9,915	345
August,					.	2,025	5,586	4,684	250
September,					.	388	390	501	38
October,						83	34	84	5
November,						228	284	224	58
					1	53,826	\$178,357	35,456	2,688

COMPARATIVE CAUSES OF FOREST FIRES FOR THE PAST THREE YEARS.

	19:	11.	191	12.	19:	13.
Causes.	Num- ber.	Per Cent.	Num- ber.	Per Cent.	Num- ber.	Per Cent.
Unknown,	1,128	44.5	649	35.1	650	24.2
Railroad,	685	27.0	640	34.6	913	34.0
Burning brush,	135	5.3	.03	5.0	148	5.5
Smokers, hunters, berry pickers, .	158	6.2	223	12.0	386	14.3
Steam sawmills,	3	.1	8	.4	6	.2
Children,	118	4.7	79	4.3	109	4.1
Miscellaneous,	309	12.2	159	8.6	476	17.7
Totals,	2,536	100.0	1,851	100.0	2,688	100.0

PRECIPITATION IN INCHES FOR THE YEARS 1911, 1912 AND 1913, WITH DECEMBER OF PREVIOUS YEAR.

	Mo	NTHS	3.			1911.	1912.	1913.	Normal
December, .						3.24	2.59	5.73	3.74
January, .					.	3.07	3.87	3.21	4.12
February, .						3.20	2.24	3.77	3.97
March, .				,		3.27	5.26	5.32	4.34
April,						2.86	4.05	4.73	3.46
May,						.89	4.03	2.85	3.37
June,						4.76	.53	3.20	3.07
July,					-	4.55	4.16	2.00	3.65
August, .						6.70	3.85	3.30	3.70
September,						3.36	1.71	2.77	4.36
October, .						3.01	1.52	7.62	4.13
November, .						5.71	3.45	2.70	3.96
Totals, .					.	44.62	37.26	47.20	45.87

In addition to our town forest wardens we have 1,740 deputy wardens, 1,205 of whom have telephone connection with our observation towers. We desire to have at least 6 deputies in each town located in different places throughout the forest area.

The permit law, which has been in operation for the past three years, has given general satisfaction. There are still a few towns that have not accepted the act which we hope will take advantage of it at their next town meeting. Nearly 17,000 permits have been issued, with no serious fires resulting from them. The comparative table on page 73 shows acreage burned, cost to extinguish and damage caused. While this table shows an increase in damage, it also shows that we have had 837 more fires than last year and 156 more than in 1911, when our loss was \$537,749.

Early in the season 12,000 cloth and cardboard notices, calling attention to the fire losses in previous years and quoting extracts from the forest-fire law, were posted conspicuously in every town in the State. In spite of this we have had 19 prosecutions, 14 of which resulted in convictions for violations of the forest law.

Exceptionally good results have been accomplished by our observation stations this year. With a drouth lasting nearly eight weeks throughout eastern Massachusetts, including the dry and sandy Cape country, and with a record of over 3,000 fires reported by the observers, our records show only 6 serious fires which were allowed to burn some days without extinguishment. A careful investigation of these 6 fires has revealed in each case the presence of one or more of three common causes, namely, inefficiency in the town forest fire organization, lack of proper forest fire

fighting equipment, and indifference on the part of the general public until such time as the fire assumed sufficient proportions to threaten their villages and homes. I do not wish to give the impression that this is the state of affairs in every town, but I must admit that it has been found to be the condition in several instances where serious fires have occurred, and until these conditions can be remedied, or this department vested with authority, equipment and funds so that we may be in a position to assume full responsibility, just so long shall we have serious fires and unnessary damages. It is of the greatest importance that some system be adopted whereby this department can be of assistance to the various towns in handling their more dangerous fires. We should be supplied with at least two motor trucks equipped with modern forest fire apparatus and capable of carrying from 10 to 15 men trained in forestfire work. These trucks should be placed under the supervision of the district forest wardens and located, one in the Cape country and one in the central part of the State. Nearly every serious fire has been practically extinguished the first day, but for various reasons was allowed to start anew the second day and was beyond control before night. It is on such occasions as these that we need men trained in this line of work with sufficient equipment to handle large fires, together with some method of quick transportation to enable them to get to the fire promptly. With automobile trucks located as above we would be able to reach any fire throughout the eastern part of the State within two or three hours.

Respectfully submitted,

M. C. Hutchins, State Fire Warden.

GYPSY AND BROWN-TAIL MOTH WORK.

The conditions of this work were discussed quite fully in last year's report by the writer. One year's time has not very materially changed them, generally speaking; nevertheless, I am frank to say that this work has never been more thoroughly comprehensive and better prosecuted than at the present time. Our organization is smaller, the men are giving greater study to the problems and more real work of a permanent nature is being done. The State Forester has constantly endeavored to impress the importance of making the moth work practical and self-supporting wherever and whenever possible. The local moth superintendents in our cities and towns are yearly acquitting themselves as men in whom confidence and public trust may be placed. When this work was first placed under my charge the constant yearly changes in the personnel of the local superintendents, due to various causes, resulted in much

of the adverse criticism so common at that time. It has not been a pleasant duty to be compelled to differ with town authorities now and then, but it is fair to say that these differences are in these later days amicably adjusted, as there is a better and more wholesome understanding of the aims and purposes of the work.

It was due to the confidence in and ability of the local moth superintendents in our various cities and towns that it was possible to dispense with the office of inspector in this department during the present year. A few years ago it was necessary to have a force of 54 men in the general supervision of the moth work; this same work is now carried on by 15 men. Better equipment and modern transportation facilities, together with experienced superintendents already alluded to, have made this possible.

Fifty more high-power sprayers were purchased by cities, towns and private parties last spring. These, together with the equipment already on hand, have increased our efficiency very much. As has been emphasized heretofore it is necessary to have tools to work with to get work done. Occasionally a town finds it easier to contract its work out rather than go to the expense of equipment of its own, but invariably it pays out more and gets less done. A local superintendent who has a power sprayer feels it incumbent upon him to properly care for the public trees, while invariably citizens apply to him to have their private estates sprayed. This private work pays for itself and indirectly is of equal benefit to the town or city, besides giving employment to labor for a longer period, which guarantees a better quality.

It is estimated that fully 500 tons of arsenate of lead were used during the season.

At stripping time each of the division men made a careful survey of the forest lands thus infested, and submitted a list to the office, — the number of acres stripped, their location, together with the owner's address. Later printed notices were sent to each of the property holders offering advice. This information has resulted in splendid co-operation, and much practical work is now under way.

The division men are endeavoring to get some real object-

lessons established in their respective territories which, once accomplished, will serve an excellent purpose by way of instruction.

The parasites and the two diseases used in suppression work are certainly pleasing factors and give great encouragement. (See Dr. L. O. Howard's report on parasites and their work which is printed elsewhere.) The diseases are thoroughly established and are extremely effective.

The United States government is concentrating its energies on holding the spread, and therefore this perplexing problem is in good hands. A belt across the State, three towns' wide, has been taken over by them, and every precaution is being exercised to hold the ground from further advance. This department is increasing its work in the towns next to those the government is caring for. Most of these towns have relatively low valuations and are largely wooded, and hence are unable to cope with the situation alone. Our strategic points now are to maintain our present ground and, through better methods and the assistance of diseases, parasites and forestry practices, eventually to hold them under subjection. It is no time, however, for us to lessen our earnestness. The government, State and town forces are all working harmoniously together, and it is believed each year will show improved conditions.

PRIVATE PROPERTY WORK AND THE MOTH SUPERINTENDENT.

The effective work accomplished by local moth superintendents last year on private property which is self-supporting has continued in increasing interest and public approval. The ideal town is one with a hustling, broad-minded moth superintendent, who is given full charge of the care of the trees and in whom everybody has confidence. Such an official should be employed by the year and his whole time given to the work. If the office of tree warden were an appointive one, the combination of the two positions would be ideal; here is one of our present difficulties, but in time this problem will settle itself. The position of city forester solves the question for the cities.

The moth superintendent, through the opportunities offered on private property, can plan his work accordingly and enlarge his usefulness to the town. The more private work there is the greater the opportunity to employ labor and hence to secure an active force of permanent men.

It does not follow that just because the moth work is fixed by law, a man selected to take charge of it cannot engage in other equally beneficial undertakings to improve and care for the trees and shrubs of his town. There is no reason why a superintendent should not do other work on private property, such as pruning and spraying for other insects, provided the work is self-supporting. The amount of private work is yearly increasing in our towns and cities, and this is indicative of better results generally and an activity that savors of better conditions in the future.

THE TENT CATERPILLAR.

One of our native insect pests which is the cause of great annoyance and damage to the farmers of Massachusetts is the common apple tree tent caterpillar.

Nearly every year it is found in more or less abundance in various sections of the State, and the past two seasons have witnessed serious outbreaks of the insect. Its favorite food is the wild cherry, which is found growing along roadsides and stone walls which serve as breeding places for it. The tent caterpillar is easily recognized, owing to its habit of building a conspicuous nest in the fork of a limb which provides a shelter for it during stormy weather.

From these tent-like homes the caterpillars immerge during pleasant days and feed on the foliage of the tree. The adult of this insect is a reddish-brown moth with light-gray markings. It is flying about from the middle to the latter part of the summer, and the female moth deposits her eggs in a compact, dark-colored mass, usually entirely encircling a twig of the tree. In this stage of its life-history it remains during the winter, the eggs hatching the following spring. As soon as hatched the little hairy caterpillars begin feeding on the buds. At this time they begin the construction of the tent or nest in a near-by fork. As the foliage develops, the caterpillars feed on it, growing all the time. The caterpillar attains maturity about the 1st of July. Fully grown, the caterpillar is nearly 2 inches long. The general color of its body is black with a



A neglected orchard in the country. Orchards of this type are a menace to the surrounding country. They are non-productive and act only as breeding places for depredations of all kinds. They should be properly cared for or destroyed. This orchard not only was infested with tent caterpillar, as shown, but abounded with a mixture of insects and diseases. Mandatory legislation is the only effective remedy.



A neglected city orchard. Real estate has gone up in value and this property is being held as a waiting investment. These trees are neglected, and constitute a menace to the surrounding country. The land for house lots would be just as valuable without them, and why not give them away for the wood. Enough obnoxious insects are bred here to destroy shade, fruit and forest trees all about it. This should not be allowed.



white stripe running the entire length of its back, and on each side may be seen a row of blue spots. Soon after reaching maturity the caterpillars leave the tree, and finding suitable shelter, transform to the pupa stage. There is but one generation of this insect a year.

The tent caterpillar is not difficult to control, and may be easily suppressed by spraying the trees with arsenate of lead, using 4 or 5 pounds to 50 gallons of water. Other methods are employed to destroy the caterpillars, such as burning them with a torch when they have collected on the nest during cool or cloudy weather. Care should be exercised in the use of a burning torch, however, as the tree may be seriously injured by burning the branches.

Another insect found in Massachusetts closely related to the apple tree tent caterpillar is the forest tent caterpillar. This caterpillar may be distinguished from the ordinary tent caterpillar described above by the fact that it has a pale blue head, and instead of the white stripe which marks the other species its back shows a row of white diamond-shaped spots. Its life-history is very similar to that of the common tent caterpillar, although it does not build a nest of any kind. As its name indicates, this insect is essentially a forest pest, although it attacks both shade and orchard trees.

Fortunately, it is held in check by natural enemies in the form of parasites and diseases, but if serious outbreaks occur the insect may be controlled by spraying with arsenate of lead, as in the case of other leaf-eating insects.

BENEFITS TO COME FROM BIRDS.

The conservation of bird life is a worthy problem, and our ornithologists and naturalists generally are rightfully solicitous for their propagation and protection. Occasionally a person gets it into his mind that this department disregards bird life in our operations. Nothing could be a greater mistake. When the effect of arsenical spraying and bird life was aired in the press a few years since, the State Forester took the matter up with Mr. Forbush, the State Ornithologist, and some definite co-operative experiments were carried on in which Mr. Forbush exonerated the spraying.

During the past two years splendid interests have been manifested in preserving bird life here in Massachusetts. Already town bird wardens have been appointed in a few towns. Bird sanctuaries, feeding grounds, covers for protection, houses, etc., are all receiving attention. This department is in perfect accord with all of this work, and further observation and recognition of assisting bird life will be given more consideration the coming season than ever. An interesting paper was presented by Mr. Wm. P. Wharton, before the Massachusetts Forestry Association at the annual meeting, which pointed out some observations he made abroad during the past summer. Some experiments along the suggestions made by Mr. Wharton may be put into operation here the coming year. There is every reason to believe that much good can be accomplished through enlisting the forest wardens and the local moth superintendents more actively in this work. These men are already town officials, and will gladly assist in every way.

Another season I shall hope to go into this whole matter more in detail. It is not a question simply of the effect of bird life upon the moth problem alone that the department of the State Forester is interested in, but one which affects all forest and shade-tree pests.

WORK ON STATE HIGHWAYS.

This department assisted the State Highway Commission to the extent of looking after the spraying of the highways throughout the moth-infested section of the State. The spraying for the elm-leaf beetle was included in this work. Where we are able to use a traveling sprayer the work accomplished is satisfactory, but it is necessary to arrange with towns to do the work in many cases with varying results, since the town equipments for doing the work are widely different. With such a mileage of State roads it would seem an economical expenditure were the State prepared to do this work through the use of modern auto truck sprayers. Besides being very effective during the spraying season they could be used for planting work, removing brush, etc., at other seasons of the year.

Work was done in the following cities and towns on the State highways, and paid for by the Highway Commission:—

STATE HIGHWAY BILLS, 1913.

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					0.14.04	~				
Acton,		•	•	٠		Grafton,	•			
					109 76					28 10
Amesbury,		٠	•		13 59	Groton,				24 08
					15 75					15 70
Andover,					31 50	Groveland,				25 74
					48 51					22 87
Ashburnham,				•	39 50	Hamilton,			•	38 70
Ashby, .					49 13					7 75
Ashland, .					19 50	Haverhill,				82 71
					45 82					70 82
Attleborough	,				16 50	Harvard,				22 92
					43 12					21 90
Barnstable, .					10 00	Hingham,				27 60
					395 00					46 50
Barre,					19 00	Holbrook,				10 50
Bedford, .					35 19	Holliston,				10 00
					32 10	Hudson,				34 87
Bellingham, .					13 10					7 76
Beverly, .					115 03	Ipswich,				19 50
					39 45					28 50
Billerica, .					29 00	Lakeville,				3 50
					36 00					42 77
Boxborough,					5 9 00	Lancaster,				37 20
					63 75					14 98
Brewster, .					30 00	Leominster,				7 81
Bridgewater,					31 40	Lexington,				94 50
Burlington, .					126 50					16 32
					34 00					3 69
					67 70					22 95
Chelmsford, .					43 13	Lincoln,				14 63
					55 30					47 00
Cohasset, .					20 40	Littleton,				17 00
					13 28					57 78
Concord, .					51 11	Lowell,				17 85
					46 78					23 19
					99 13	Lunenburg,				30 24
Dennis, .					6 00					11 85
Dighton, .					93 77	Marlborough	h,			144 20
Dover, .					30 94					96 91
Dracut, .					42 00	Marshfield,				28 50
					21 32	Melrose,				9 60
Duxbury, .					16 00					22 20
Falmouth, .					70 55	Merrimac,				18 96
Fitchburg, .					51 95					10 69
					25 44	Methuen,				38 25
Foxborough,					8 00					48 43
					87 00	Middleborou	ıgh,			29 03
Framingham,					78 25	Millbury,				6 15
					29 92					4 47
Franklin, .					18 50	Milton,				1 98
					26 50	Natick,				13 22
					6 50					34 85

STATE HIGHWAY BILLS, 1913 - Concluded.

									_	
Needham, .				\$30 65	Swansea, .				3127	75
Needham, .			•	27 53				. 4		40
				9 96	Taunton, .		•	•		39
Newbury, .				51 64	Templeton, .					50 50
Newbury, .				23 71	Templeton, . Tewksbury, .			٠.		- 60
Newburyport,				22 95	lewksbury, .		٠	•		58
ivewburypore,	•	•	•	13 64	Townsend, .				162	
North Andover.				92 40	Townsend, .	•		•		00
North Andover,	•	• `		56 25						80
North Attleborou	σh			64 05	Tyngsborough,				-	50
North Reading.				14 00	Tyngsborough,	•		•		25
roin manne,	•		•	23 75	Wayland, .					75
Northborough,				101 50	wayianu, .			•		98
ror moorough,		·	•	26 60	Wellfleet, .					00
Norton								:		25
	·	•	Ċ	32 75	Weimain, .	•		•		50
Norwood				5 50	West Boylston,					38
	•	·		62 10	West Bridgewater					00
Pepperell, .				37 50	West Dilagewater	,			_	68
e opporous, .			Ċ	27 25	West Newbury,					22
Quincy, .				10 00	Wood Itombaly,		•	•		66
Reading, .			Ċ	63 00	Westborough,					00
				92 00	Woodbolougii,	•	•	·		70
Rockland, .				20 00	Westford				_	00
· · · · · · · · · · · · · · · · · · ·				68 75	., ., .,			·		00
Rowley, .				49 80	Westminster.					50
				53 32	Weston,					50
Salisbury, .				43 19	, , , , ,					50
				41 65	Westwood, .					50
Sandwich, .				21 00	Weymouth, .				30	00
Scituate				55 20	, ,					81
· ·				79 70	Wilmington,				24	95
Shrewsbury,				26 10	,				50	17
Somerset			,	110 37	Winchester, .				50	80
Southborough,				29 75	,				48	15
3 ,				29 40	Woburn				27	
Sterling, .				65 08	,				61	50
				22 00					13	19
Stoneham, .				33 70					91	98
				82 74	Worcester, .				15	68
Sudbury, .				162 40						_
,				92 80	0 11/1 1 1				930	
Sutton				8 00	Credit by balance,				369	94

PARASITE WORK.

REPORT OF Dr. L. O. HOWARD, CHIEF OF THE BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF ENTOMOLOGY, WASHINGTON, D. C., Dec. 20, 1913.

Prof. F. W. RANE, State Forester, Boston, Mass.

DEAR PROFESSOR RANE: — In accordance with your request, I take pleasure in submitting a brief report upon what has happened to the imported parasites of the gypsy moth and the brown-tail moth during the year.

Yours very truly,

L. O. Howard, Chief of Bureau.

The work on parasites and predatory enemies of the gypsy moth and brown-tail moth has continued along the same lines as during the previous year, except that no attempt has been made to import additional parasites this season. The material imported from Europe last year has been colonized, and an effort has been made to determine the extent to which the species secured have established themselves in the field.

Owing to the fact that one of the imported egg-parasites of the gypsy moth, Anastatus bifasciatus, breeds very slowly, extensive collections were made during the last winter of parasitized gypsy moth egg-clusters from colonies that were planted in previous years. From this material it has been possible to liberate 1,500,000 parasites of this species, and these have been placed in 1,500 colonies in sections where the insect had not become established. Eight hundred colonies were planted in towns along the western border of infestation, and the balance was liberated in a number of towns in the northern part of Massachusetts. During November of this year collections were made in New Hampshire, in the colonies of Anastatus that were planted a year ago, and examination showed that these plantings were practically all successful, although the spread has been slow. From these collections about 100,000 parasitized eggs were secured and will be used for colonization in New Hampshire next spring.

Investigations have shown that another egg-parasite of the gypsy moth, namely *Schedius kuvanae*, has become perfectly established in several colonies where it had previously been planted. During the past year there has been a decided increase in the abundance of this parasite, and in some cases it has spread nearly a mile and a half from the limits of its last year's spread.

The parasites attacking the caterpillars of the gypsy moth have been found more abundantly than during the previous year. Compsilura

concinnata, a species of Tachinid fly, was very abundant during the summer of 1912, especially in the territory which was longest infested by the gypsy moth, and continued to spread during the past summer. It has not been so abundant in the oldest infested territories as in some of the outlying colonies. Collections of more than 1,100 gypsy moth caterpillars made in 4 towns in central Massachusetts show a parasitism by this species of over 40 per cent., while similar collections in the central infested area have indicated an average parasitism of about 5 per cent. It is probable that the decrease in parasitism in the old infested area, as far as this species is concerned, is due to the fact that gypsy moth caterpillars are not nearly as abundant as they were during the previous year, and also because of the enormous numbers of the American tent and forest tent caterpillars which were present in this region and which are also attacked by this parasite.

Limnerium disparidis and Apanteles species were received from Europe for the first time in 1911, and were planted in several badly infested gypsy moth colonies. Both species were recovered during the summer of 1912, which indicated that it is possible for the insects to withstand our cold winters. In the case of the latter species, as high as 7 per cent. of parasitism of gypsy moth larvæ was found. The present summer the Limnerium was recovered from a single locality where the species was liberated in 1911. Although it has evidently become established, it has not thus far shown marked ability to increase in the gypsy moth infested area in New England.

Another species of Apanteles, namely, A. lacteicolor, an important parasite of the brown-tail moth caterpillars, has been recovered in large numbers, and has been found to attack gypsy moth caterpillars in widely separated regions. This species seems to be multiplying more rapidly than any of the other Hymenopterous parasites of the gypsy moth. In order to colonize this species over as wide an area as possible, an arrangement was made with the State Entomologist in New Hampshire, and the superintendent of moth work in Maine, to liberate as many colonies as possible along the outskirts of the area infested by the brown-tail moth in those States. Small collections of gypsy moth larvæ were made at Melrose, and in some cases 10 per cent. of the larvæ were killed by this species. In several localities in New Hampshire the past summer the cocoons of this parasite were very abundant, and several hundred were easily collected for experimental work. They were taken, for the most part, on the foliage of trees, and attached to dead caterpillars.

The Calosoma beetle (Calosoma sycophanta) has been observed in large numbers in towns where bad colonies of the gypsy moth were present. It has not been possible to obtain definite records of the amount of benefit derived from this species, or of its abundance, except in cases where trees were burlapped, as these bands furnish favorable hiding places for the caterpillars and are favorite locations for the beetles and larvæ to obtain food. In such cases, where caterpillars were abundant, 20 or more of

the Calosoma larvæ have frequently been found under a single burlap band on an average-sized tree. As they feed upon the pupæ as well as upon the caterpillars, the amount of benefit derived is very great, although it is difficult to figure the percentage of larvæ killed.

From collections made during the winter of 1912–13 it was determined that *Monodontomerus aereus* has spread over practically the entire territory now known to be infested by the brown-tail moth. It was not found in as large numbers as during the previous year. *Pteromalus egregius* has been found widely scattered over the area infested by the brown-tail moth, and its numbers are slowly increasing, judging from the records that have been secured from sample collections.

There is thus no doubt that a number of the imported species are thoroughly established, and that they are increasing each year, and, further, that many hundreds of thousands of caterpillars were killed by them during the past summer.

THE WILT DISEASE OR "FLACHERIE."

The experimental work with this disease has been carried on almost wholly during the past season under the direction of Dr. W. M. Wheeler of the Bussey Institution of Harvard University and Dr. L. O. Howard, division of entomology, United States Department of Agriculture. The results of this work will be reported on later. The disease itself is found spread generally throughout the moth-infested territory, and is proving a great factor in the control of the gypsy moth. It is to be hoped that through the studies by experts discoveries may be made whereby this disease can be even further made use of in the work of suppression.

THE FUNGOUS DISEASE OF THE BROWN-TAIL MOTH.

The work of propagating and disseminating this disease was undertaken and carried out under the usual co-operation with Harvard University. The work of the previous season having been so successful it was thought we could not help getting results from our ripened experience. We had plenty of caterpillars to work with, but, unfortunately, try as we might, the spores could not be secured to produce the results wanted. The cool season, we believe, had most to do with it. Later on in the year, however, a number of places were found where the wilt disease occurred in nature and was extremely effective. We are not discouraged, however, and hope to regain our

ground in producing the disease on a large scale for general distribution the coming spring. One thing is perfectly sure and that is, this disease is extremely effective in destroying the brown-tail moth larvæ.

NORTH SHORE WORK.

The usual co-operative work on the North Shore between the summer residents committees, the towns and the State Forester's department, has been carried on again the past season.

If those who are in touch with this work should be consulted, it is believed that the universal verdict would be that the season has been a most successful one. Through his continued splendid co-operation, this department feels especially indebted to Col. Wm. D. Sohier for making it possible to demonstrate what can be accomplished under favorable environment. The North Shore work is beginning to radiate its effect elsewhere.

The following is a reproduction of the financial statement of the summer residents committees' report that relates to the moth and forestry work:—

DETAILS OF THE COST OF THE WORK FROM JULY TO JULY.

20 20 21 21 21 20 0	0102 01									
Spraying 3,610 acres, .								. \$	19,973	43
Cutting and burning 407 a									6,919	
Creosoting 2,871 acres, .									4,040	57
Tanglefooting,						1.			35	57
Leopard moth work, .						٠.			192	11
Spraying for aphids,									20	21
Road repairing, 7,925 square									92	80
Tool repairing,									851	69
Repairs on shop,							"		343	00
Repairs on engines, .		٠.,					4		1,019	07
Experimental work,									12	00
								\$3	33,499	78
Av	ERAG	е Со	ST	of V	Vork	ζ.				
Spraying per acre,									\$5	53
Cutting and burning per a	acre.								17	
Creosoting per acre, .	d								1	41



A view of some of the old trunks of elms which have died from neglect in spraying. From a business standpoint these trees could have been sprayed yearly for the interest upon the cost of removing them Estates losing large trees like these also invariably greatly depreciate in value. It is, therefore, good business for municipalities and individuals to spray and care for their trees.



A deciduous forest at Concord entirely defoliated by the forest tent caterpillar. This photograph was taken by the State Forester on July 3. This insect, it is predicted, will be very destructive the coming spring. Spraying with arsenate of lead, as for moths, will control it.



LECTURES AND ADDRESSES.

The State Forester has been called upon for a large number of engagements throughout the year. As much of this work has been done as time would permit. Mr. C. O. Bailey and Mr. H. O. Cook have assisted in this work. Mr. R. G. Pierce, the expert on the chestnut bark disease, has in addition to those listed made quite a campaign throughout the State where the chestnut is indigenous.

Now that the Massachusetts Agricultural College has a department of forestry, the lectures heretofore given by the State Forester have not been necessary, and the past season the lectures were confined to the subject of State forest policy.

The following organizations were addressed during the year: —

Brewster Village Improvement Society. Essex County Pomona Grange.

Russell State Grange Field Meeting.
Middlefield Highland Agricultural Society

Acton State Grange Field Meeting.

Concord Men's Club.

Cohasset Men's Club. Stoughton Board of Trade.

Wareham Men's Club.

Hale Club, Boston.

Fitchburg Forestry Association.

Paxton Grange.

West Brookfield Field Meeting, State Grange.

Fall River Chamber of Commerce.

Watertown Men's Club.

Bristol County Fair.

Holden Farmers' and Mechanics' Association.

University of Syracuse, Syracuse, N. Y. Men's Club, Newton Center.

Paper Makers' Association, Boston.

Town of Dover, Town Hall.

Quinquebog Historical Society, Southbridge.

Hyde Park Village Improvement Association.

Borough Pomona Grange, Berlin.

New Bedford Forestry Association.

New Bedford High School.

Pomona Grange at Medfield.

Massachusetts Agricultural College.

Association of Tree Wardens and Foresters, Amherst.

Rural Club.

Amesbury Village Improvement Association.

Wellesley Village Improvement Association.

East Freetown Grange.

Men's Club of Congregational Church, Arlington.

Milton Woman's Club.

Bridgeport Club, Conn.

Smith College.

East Bridgewater Men's Club.

Public Meeting, town of Hubbardston.

Springfield Forestry Association.

Leominster Forestry Association

Twentieth Century Club.

Jamaica Plain Men's Club.

Business Men's Association and Natural

History Club, Plymouth.

State Grange Field Day, Colrain.

Royalston Improvement Association.

State Grange Field Day, Springfield.

State Grange Field Day, Orange.

Massachusetts Tree Wardens' and Foresters' Association, Boston.

Massachusetts State Firemen's Association.

Nantucket Civic League.

Fire Prevention Association, Philadelphia.

Public meeting, City Hall, Dedham.

Society for the Promotion of Agricultural Science.

Massachusetts State Grange.

Hyannis Woman's Club.

State Normal School, Hyannis.

Avon Club, Winchendon.

FIELD MEETINGS OF THE STATE GRANGE.

The field meetings of the State Grange that have been held during the summer months for the past two years in various parts of the State have been exceptionally interesting, and without doubt have served to stimulate the interest of our farmers in all the movements that have been inaugurated in the interest of rural progress.

While the discussions at these meetings covered many fields of public endeavor, it was gratifying to note the deep interest that was manifested in the talks given on forestry by State Forester F. W. Rane and Sec. C. O. Bailey, who were speakers at several of these meetings.

The Society for the Promotion of Agricultural Science convened at Washington, D. C., November 11, and the Massachusetts State Forester delivered the following paper before said society:—

WHAT MASSACHUSETTS HAS ACCOMPLISHED FOR SCIENCE IN HER FIGHT AGAINST THE GYPSY AND BROWN-TAIL MOTHS.

The pages of universal history may be scanned in vain for a record of a war between nations which has not resulted in new inventions or discoveries that have served to advance civilization, — discoveries that were made possible by the exigencies of the times. This progressive knowledge has become the bulwark of the development and stability of the nations of the earth. In her war against the gypsy and brown-tail moths, the experience of Massachusetts has not been at variance with past history.

Throughout the long and costly struggle to save our forest and shade trees from being completely destroyed by these voracious insects, inventive minds, as in other wars, have been studiously engaged in developing better and more destructive methods of warfare, from which a permanent addition to science has resulted.

The Commonwealth of Massachusetts has placed all science in its debt by the interesting and successful experiments which it has carried on in the importing and breeding of parasites and other natural enemies which prey on the gypsy moth and the brown-tail moth. This work was inaugurated on a large scale in co-operation with the United States Department of Entomology in 1905, shortly after the Commonwealth had for the second time undertaken to suppress these two insects. The work has been attended with a large measure of success, and during its prosecution various interesting scientific discoveries have been made in regard to these insects and their life-history, and also in regard to the life-history of their various parasites and related insects.

The importation of the Calosoma beetle (Calosoma sycophanta) from Europe to destroy the gypsy moth has resulted in much practical and interesting data in regard to the beetle and its habits. It is a pronounced success.

The construction and equipment of the laboratory where the work has been carried on has attracted the attention of the scientists all over the world, and in the year 1907 several eminent scientists from this country, Europe, Africa and Australia visited the parasitic laboratory, which was then at Saugus, Mass. None of these men could suggest improvements in the methods used, but they all found many to admire and some to copy in their own countries where similar lines of investigation were being inaugurated.

Much experimenting has been carried on, also, with the fungous disease of the brown-tail moth and with the so-called wilt disease, or "flacherie," which attacks and destroys the gypsy moth to a large extent.

The development of spraying machines and insecticides makes one of the most striking and important chapters in the history of the moth-suppression campaign. The necessity for an insecticide possessing superior adhesive qualities, at the same time containing sufficient poisonous properties to destroy the caterpillars, was early recognized. Spraying with common arsenical poisons, such as Paris green, London purple, etc., had been in use for many years, but with indifferent success. When it became evident that these insecticides were not accomplishing the work desired, an effort was made to discover a more effective poison, and much time and labor were spent in this undertaking. Some of the best chemists obtainable were employed by the State and put on this experimental work, which resulted in the production of arsenate of lead.

This work was carried on in the year 1893. Since then the use of this material has increased by leaps and bounds, until at the present time the manufacturers of this article are shipping it to all parts of the world. Thus to Massachusetts moth work the agricultural world owes an everlasting debt of gratitude for her persistent and successful endeavors along this line. The results of the untiring efforts of the Massachusetts Forestry Department in developing improved spraying machines, hose couplings, nozzles and other apparatus of this nature have completely revolutionized this industry, and present a record of accomplishment in this line never before equalled.

By improved machinery in spraying we are now able to spray woodlands at about \$6 an acre, while formerly the expense was \$40 or more. The work, as well, is far more thoroughly done. While this improved spraying machinery is highly appreciated in the moth-infested country of New England at present, it will take time for others to recognize its merits, until the use of similar machines is demanded elsewhere. When the elm-leaf beetle and similar insects and diseases begin affecting tall trees elsewhere, which is inevitable in the future, then I am confident the results of our Massachusetts inventions will be appreciated. Already

the cities of Washington, Baltimore and Albany are using these highpower tree sprayers and others are bound to follow.

By being able to throw a stream over the tallest of our shade trees from the ground, and hence eliminating the cost of climbing, not only is the great expense of labor overcome, but a whole street can be sprayed during the same length of time formerly required for the treatment of but a few trees. Our latest device is to substitute auto trucks for horses in our highway, shade-tree, park and city work which is proving very satisfactory. The same power that drives the auto also does the spraying.

With our present spraying equipment of all kinds in Massachusetts alone, I believe we use in a single season nearly 1,000 tons of arsenate of lead. The State Forester's contract for lead the past year was 500 tons.

One would hardly expect that such a pest as the gypsy moth would be an aid to the introduction of forestry methods in the treatment of our woodlands. Rather, one would expect it to be the reverse, but such is not the case.

When the office for the suppression of the gypsy moth and that of the State Forester were united in 1908, the writer strongly advocated that forest thinnings and improvement cuttings would be of great assistance in combating the depredations of this pest. He argued that not only would the woodlands be in a better physiological condition for having the weakened and suppressed trees removed, and hence better able to stand the stripping of the caterpillars, but in addition the operations of hand suppression and spraying could be more cheaply performed because the superfluous trees would be taken out. Such cuttings thereafter as were made directly by the department were supervised by trained foresters, and at the same time he urged municipalities and private owners to do as much of this work as possible and to make use of his assistants.

Within the past year or two scientific facts have come to light which vastly add to the importance of modern forestry practice as a control to the gypsy moth. Mr. Burgess, an entomologist of the United States Bureau of Entomology, who was doing co-operative work with the Massachusetts State Forester, in studying the feeding habits of the gypsy moth in the laboratory and the field, found that this insect is by no means the omnivorous feeder that it is commonly supposed to be; that although it does eat the leaves of a large variety of trees, it actually thrives best on only a few, and that if deprived of this favorite food entirely, soon succumbs to parasitic enemies.

These experiments of Mr. Burgess were supplemented by some observations of Mr. Fiske, another co-operating government entomologist, made in Europe. Mr. Fiske returned to this country last year convinced that the *chief* reason for the comparative harmlessness of this insect in that continent is due to the better silvicultural condition of the European forests. This silvicultural condition has been brought about by centuries of forestry practice. In addition, as already observed in Massachusetts with white pine, its freedom from the pest in clear stands proved also

true of all coniferous growth abroad, especially in Germany, because the conifers are all highly resistant trees. The writer, after a study of these conditions in Europe in the summer of 1912, returned with even greater conviction that forestry management can be made a great factor in moth control. Under proper conditions we too should have a much larger percentage of coniferous growth, but unscientific lumbering and forest fires have conspired to reduce it to a minimum.

These discoveries have molded beautifully into the Massachusetts State Forester's methods of management, and offer a wide field for forestry development. Our woodlands should be thinned and the favorable trees, notably the oaks and birches, removed. Where there is little chance of resistant species taking the place of those cut out, artificial reforestation must be resorted to. Such operations must in time result in the removal of a large share of our scrubby oak woodlands and their replacement by fine plantations of conifers; clear stands of resistant deciduous species are also practical undertakings. So important has this subject appeared to the United States Bureau of Entomology that they have induced the United States Forest Service, during the past year, to co-operate in experiments to test the value of forestry work in moth suppression. The Massachusetts State Forester has increased his staff by the addition of two professional foresters to the moth division of his department, and they are carrying on a regular campaign urging woodland owners in mothinfested sections to put their lands under proper forestry management. Several gangs are now at work under direction, making improvement cuttings.

If forestry work is an aid in the control of the moth, conversely the gypsy moth is of assistance in the development of forestry practice, although at first sight it would seem to be a death-blow to this development. I can safely say that as a result of our moth depredations thousands of acres of our woodlands are being put under scientific management which otherwise would never have had such care for some time to come.

In conclusion, therefore, while the expenditure of vast sums of money has been necessary to combat the moth ravages in one of the most noted insect warfares ever undertaken by a single State, nevertheless, such an expenditure has been fully warranted by the results; and to Massachusetts must be attributed the courage of attempting and prosecuting a work recognized the world over as a most plausible and worthy undertaking. The many beneficial accomplishments which have been the outgrowth of this work have contributed largely to the enrichment of both science and industry, thus making Massachusetts again a world benefactor.

The following is an abstract of an address delivered by State Forester F. W. Rane before the Convention of the Massachusetts State Firemen's Association at New Bedford, Sept. 24, 1913:—

IMPORTANCE OF CONTROLLING FOREST FIRES IN MASSACHUSETTS.

Mr. President and Gentlemen of the State Firemen's Association:

— I first desire to give you the assurance of my grateful appreciation of the invitation which enables me to be present at this time, privileged to participate in the deliberations of your association.

I believe that it is fast becoming an acknowledged fact that no question is of greater importance in its relation to the future prosperity of our Commonwealth than the development of forestry. The development of forestry in Massachusetts is an effort to apply a policy of foresight in handling what may be termed one of our greatest natural resources. In other words, it is a part of the great conservation movement, the importance of which is acknowledged by all thinking people.

But, gentlemen, forestry, like all other great undertakings, has to encounter obstacles and overcome them before the fullest measure of success can be attained.

In speaking to your organization at this time I shall endeavor to confine my remarks to that branch of the forestry service which, in my opinion, most directly appeals to you, namely, forest fires.

Fires injure forestry and forests in this State in several ways, which may be classified under two general divisions,—direct and indirect damage.

We all recognize the injury when commercial woodlands are burned over and the trees are killed outright, or are so injured that they will die in time. In the more thickly settled portions of our Commonwealth our woodland has a worth in excess of its value as timber or cord wood,—an æsthetic value, so to speak,—and in such cases fires cause a damage which cannot be reduced to terms of money. In any case, it is difficult to express the damage caused by fires in terms of money, but in those comparatively few cases in which it can be done, the average yearly loss is more than \$200,000, and I feel safe in saying that this sum represents only a fraction of the real danger.

A direct injury, which is caused by fire and which is not considered by the ordinary layman, is the destruction of young growth. From this young growth our future forests must come, and if these immature stands are destroyed, future values are wiped out at the same time. If a plantation of young trees which has been artificially set out is destroyed, we are quick to recognize the loss, but a reproduction which has come up naturally is just as valuable, provided it gives indications of making a stand of trees as large and as salable as the artificial plantation. Young stands are not to be judged by their present condition, but by their future possibilities.

Constant fires exhaust the soil, consuming as they do the humus or dead-leaf matter which is the material from which nature manufactures our loamy soils. By the destruction of this same humus the waste-storage possibilities of the soil are taken away and drought and floods become more frequent.

These direct injuries, as great as they are, I believe are exceeded by the indirect.

Fires, or rather the fear of them, are our greatest obstacle to the practice of forestry in this State, and on the practice of forestry depends the continued existence of our lumber industry. Approach an owner of woodland and urge on him a certain forestry operation, and what will be his reply? "Oh, yes, what you say is true enough, but how am I to know that my woodlands will not burn up next year?"

Our lumber industry is more important than people realize. Our annual cut amounts to nearly 500,000,000 feet. For this lumber there is paid to the landowner \$2,500,000, and there is paid out in labor to harvest this crop at least \$1,000,000 more. These figures deal only with conversion of the trees into rough lumber, and have nothing to do with the further conversion of this lumber into boxes, furniture and the thousand and one articles into which our raw lumber is made. Unless we can induce our land owners to take up the proper management of our forests, this important industry is sure to be wiped out, and there is nothing which will give more encouragement to the proper management of our woodlands than the reasonable protection of them from fire. To this end we have labored hard to build up an effective forest fire protective system, and I desire to take this opportunity to express to you my appreciation of the splendid support that has been given by this association to Mr. Hutchins, the State Fire Warden, and his four district men who have been in direct charge of this work.

It may be of interest to some of you to know just what our forest-fire organization consists of. The State Fire Warden, who has supervision of the work, is assisted by four district fire wardens who are supplied with runabout automobiles. These men are charged with the supervision of the observation stations within their district, and are also continually patrolling the towns comprising their district, instructing the forest wardens and their deputies relative to their duties, assisting in extinguishing fires, visiting the selectmen and impressing upon them the importance of better equipping their towns with equipment for handling forest fires, and towns with a valuation of \$1,500,000 or under, the advisability of taking advantage of the reimbursement act, whereby the State will reimburse such towns one-half for forest-fire equipment that they may purchase, the State's share not to exceed \$250, and to be approved by the forestry department.

We also have an inspector who devotes his entire time to inspecting locomotives and portable saw mills. Several hundred locomotives have been inspected, and the reports show that while they were all equipped with spark arresters, as required by law, in many cases these devices were so thoroughly out of repair as to make them absolutely useless. We have also at the present time 23 observation stations established in the Commonwealth, 4 new steel towers having been built this year as follows: Manchester, Wakefield, North Hanson and Bournedale, temporary towers

being built at Savoy and Pelham. These towers are all equipped with maps, field glasses and telephone which connects with over 1,800 forest wardens and deputies, the observers in charge being local men in nearly every instance, who are thoroughly familiar with the surrounding territory.

While we have had nearly 3,000 fires reported from these stations to the different wardens, we have had very few serious fires, notably, the Freetown, Bourne, Yarmouth and Shutesbury fires which were allowed to burn for days. These fires were practically extinguished the first day, but were left at night without sufficient help to control, only to start up the second day, unnecessary back fires being set that were soon beyond control.

One matter which I deem of vital importance, and to which I desire to call your attention, is the necessity of a law which will provide for a reasonable disposition of the slash or brush which is now left on the ground following wood and lumber operations. I might state here that the two or three serious fires which I have referred to would have been impossible had it not been for the fact that where they occurred hundreds of acres of this slash had been left, so extinguishment was made almost an impossibility. For several years I have recommended in my annual report to the Legislature the imperative need of a law which would obviate this condition, but no action has yet been taken. The incoming Legislature will again be asked to consider the same subject, and I desire to say here that your organization can render no more valuable service to the State Forestry Department than by sending representatives before the proper committees of the Legislature to urge the passage of the bill.

THE FIFTH NATIONAL CONSERVATION CONGRESS.

The conservation of our natural resources and their proper use constitutes a problem of gigantic proportions upon the wise solving of which depends very largely the abiding prosperity of the nation. Of such vital importance was it considered by Theodore Roosevelt, that in May, 1908, he called together in convention the Governors of all the States of the Union to consider the question of how best to bring about a reform of the present wasteful methods of production and utilization of our natural resources, such as minerals, timber, water power, soils, in fact, all the natural wealth with which we as a nation are so richly endowed, to the end that their benefits may be shared equally among all the people, and that there may be transmitted a practically undiminished capital to the generations to come. As a result of that conference there was organized the National Conservation Congress, and the conservation senti-



A view of sprayed and unsprayed trees on the North Shore. The modern highpower solid stream sprayer has revolutionized the work of spraying woodlands. One thorough spraying has held the foliage against very adverse conditions, as shown at the left.



ment was crystalized into a nation-wide movement. Chief among the objects for which the National Conservation Congress was created, as annunciated in its declaration of principles, is to "afford an agency through which the people of the country may frame policies and principles affecting the conservation and utilization of their resources, to be put into effect by their representatives in State and federal governments." This year's congress convened at Washington, D. C., on November 17, and its sessions lasted through four days. The official delegates appointed by the Governor to represent Massachusetts at this congress were State Forester F. W. Rane and Sec. C. O. Bailey. Its discussions were devoted largely to forest conservation because of the national importance of the subject in its many phases. Practically all the leading foresters of the United States were in attendance, and the discussions on the various branches of forestry were of great value to those who were privileged to hear them.

NEW LEGISLATION.

The following bills relating to forestry were enacted at the last session of the General Court and were intended to advance the forestry interests of the Commonwealth:—

Forest Taxation.

Reference was made in the last annual report of the adoption by the voters of the State of an amendment to the Constitution relative to the taxation of wild or forest lands. This action was taken at the election in 1912, following which the Legislature of 1913 passed the following resolve:—

ACTS OF 1913, CHAPTER 131.

RESOLVE TO PROVIDE FOR THE APPOINTMENT OF A COMMISSION TO INVESTI-GATE AND REPORT UPON THE TAXATION OF WILD OR FOREST LANDS.

Resolved, That the governor, with the advice and consent of the council, shall, within thirty days after the passage of this resolve, appoint a commission of five persons, citizens of the commonwealth, to be known as the commission on the taxation of wild or forest lands. Said commission shall investigate the effect of the present laws relating to the taxation of wild or forest lands in this commonwealth, and the laws and systems of taxation of such lands in operation in other states and countries, shall correspond

so far as may be advisable with authorities in this commonwealth and in other states and countries in regard to said matters, and shall draft an act providing such methods of taxation of wild or forest lands as will develop and conserve the forest resources of the commonwealth. The said commission shall also investigate the present policy of the commonwealth with regard to the acquisition and management of wild or forest lands and report what further legislation, if any, is necessary. The report shall also contain a compilation of statistics and other information obtained by the commission and shall be made on or before the first Wednesday in January, nineteen hundred and fourteen. Of the said commissioners, one member shall be the tax commissioner and one member shall be the state forester. The members of the commission shall serve without compensation, but may incur such expenses in the performance of their duties, not exceeding the amount of five thousand dollars, as may be authorized by the governor and council. The commission shall be provided with suitable quarters in the state house or elsewhere. [Approved June 16, 1913.

Acting under the authority given him by this resolve, the Governor appointed, as members of this commission, the State Tax Commissioner, W. D. T. Trefry, the State Forester, F. W. Rane, as required by the resolve, Mr. Harold Parker, ex-chairman of the Massachusetts Highway Commission, Prof. C. J. Bullock, professor of economics at Harvard University and Mr. Charles H. Preston of Danvers. The commission promptly organized with Tax Commissioner Trefry as chairman, and immediately entered upon its duties. Public hearings were advertised and held in the following places: October 31, at the State House; November 5, at Greenfield; November 6, at Springfield; November 7, at Pittsfield; November 14, at Worcester; November 21, at the State House; November 28, at Middleborough.

Nearly all of these hearings were largely attended, and the commission acquired very much valuable information and data bearing upon the problem given it to solve.

Moth Superintendent and Forest Warden Appointments changed.

The importance of beginning moth suppression operations as early as possible in each year with a thoroughly organized force of men in every city and town where such work is necessary, also to allow for sufficient time to instruct forest wardens with regard to the prevention and extinguishment of forest fires be-

fore the dry and dangerous periods occur, were the reasons for changing the time of making the appointment of local moth superintendent and forest warden from March or April to January.

ACTS OF 1913, CHAPTER 6.

AN ACT RELATIVE TO THE TIME OF APPOINTMENT OF LOCAL SUPERINTENDENTS FOR THE SUPPRESSION OF GYPSY AND BROWN TAIL MOTHS AND RELATIVE TO THE APPOINTMENT OF FOREST WARDENS.

Be it enacted, etc., as follows:

Section 1. Section sixteen of chapter thirty-two of the Revised Laws, as amended by section one of chapter four hundred and seventy-five of the acts of the year nineteen hundred and seven, is hereby further amended by striking out the words "March or April", in the third line, and inserting in place thereof the word: - January, - so as to read as follows: -Section 16. The mayor and aldermen in cities and the selectmen in towns shall annually, in January, appoint a forest warden, and they shall forthwith give notice of such appointment to the state forester. The appointment of a forest warden shall not take effect unless approved by the state forester, and when so approved notice of the appointment shall be given by the mayor and aldermen or by the selectmen to the person so appointed and approved. Whoever having been duly appointed fails within seven days after the receipt of such notice to file with the city or town clerk his acceptance or refusal of the office shall, unless excused by the mayor and aldermen or by the selectmen, forfeit ten dollars. Nothing in this act or in any other act shall be construed to prevent the offices of tree warden, selectman, chief of fire department and forest warden from being held by the same person.

SECTION 2. Section four of chapter three hundred and eighty-one of the acts of the year nineteen hundred and five, as amended by section two of chapter two hundred and sixty-eight of the acts of the year nineteen hundred and six, and by section one of chapter five hundred and twenty-one of the acts of the year nineteen hundred and seven, and by chapter one hundred and fifty of the acts of the year nineteen hundred and ten, is hereby further amended by striking out the words "March or April", in the third line, and inserting in place thereof the word: - January, - so as to read as follows: - Section 4. The mayor and aldermen in cities and the selectmen in towns shall annually in the month of January appoint a local superintendent for the suppression of gypsy and brown tail moths. Said superintendents shall, under the advice and general direction of the state forester, destroy the eggs, caterpillars, pupæ and nests of the gypsy and brown tail moths within their limits, except in parks and other property under the control of the commonwealth, and except in private property, save as otherwise provided herein. The appointment of a local superintendent shall not take effect unless approved by the state forester, and when so approved, notice of the appointment shall be given by the

mayor and aldermen or the selectmen to the person so appointed. When any city or town shall have expended within its limits city or town funds to an amount in excess of five thousand dollars in any one fiscal year, in suppressing gypsy or brown tail moths, the commonwealth shall reimburse such city or town to the extent of fifty per cent of such excess above said five thousand dollars.

Section 3. This act shall take effect on the first day of January, nineteen hundred and fourteen. [Approved May 2, 1913.

Furnishing Arsenate of Lead at Cost.

As a further aid to property owners in the suppression of gypsy and brown-tail moths, a bill was passed by the General Court, giving authority to local superintendents in such towns as are receiving aid from the State to furnish arsenate of lead to property owners at a price not to exceed the cost to the State.

The act reads as follows: -

An Act to authorize Local Moth Superintendents to furnish Arsenate of Lead to Real Estate Owners.

Be it enacted, etc., as follows:

Section 1. For the purpose of assisting in the extermination of gypsy and brown tail moths, the local moth superintendent in any city or town now receiving aid from the commonwealth, in suppressing the said insect pests is hereby authorized to furnish, at the cost thereof, arsenate of lead to any owner of real estate situated within the limits of such city or town. Material purchased under the provisions hereof shall be used only for the suppression of gypsy and brown tail moths and only upon land of the purchaser.

Section 2. The amounts due for material furnished under the provisions of section one shall be charged by the local moth superintendent to the owners of private estates and shall be collected in the same manner as the amounts assessed for private work, and shall be a lien on said estates in the same manner as the assessments for private work. The amount thus charged shall be deducted from the total amount expended in each city or town in the suppression of the gypsy and brown tail moths in the same manner as the amounts charged for private work, as provided for in sections six and seven of chapter three hundred and eighty-one of the acts of the year nineteen hundred and five and its several amendments. [Approved May 7, 1913.

Public Domain.

Taking cognizance of the great possibilities which lie in forestry as a means of adding to the wealth and prosperity of the State, the Massachusetts Forestry Association has devoted much of its energy during the past year to organizing branch associations in various cities and towns of the Commonwealth, with the hope that an aroused local interest would result in the establishment of municipal forests in conformity to the public domain act as amended last year through the efforts of that association.

The act as amended follows: -

Acts of 1913, Chapter 564.

An Act relative to Public Domain.

Be it enacted, etc., as follows:

SECTION 1. Section twenty-three of chapter twenty-eight of the Revised Laws is hereby amended by striking out the word "a", before the word "town", in the second line, and inserting in place thereof the words: — an annual, — by inserting after the word "therefor", in the eighth line, the words: — but the indebtedness so incurred shall be limited to an amount not exceeding one half of one per cent of the last preceding assessed valuation of the city or town, — and by striking out the words "commonwealth for the benefit of the", in the eleventh line, so as to read as follows: - Section 23. A town, by a vote of two thirds of the legal voters present and voting at an annual town meeting, or a city in which the city council consists of two branches, by a vote of two thirds of the members of each branch, and a city in which there is a single legislative board, by a vote of two thirds of the members thereof, present and voting thereon, may take or purchase land within their limits, which shall be a public domain, and may appropriate money and accept gifts of money and land therefor; but the indebtedness so incurred shall be limited to an amount not exceeding one half of one per cent of the last preceding assessed valuation of the city or town. Such public domain shall be devoted to the culture of forest trees, or to the preservation of the water supply of such city or town and the title thereto shall vest in the city or town in which it lies.

Section 2. Said chapter twenty-eight is hereby further amended by striking out section twenty-five and inserting in place thereof the following:

— Section 25. The city or town forester in each city or town, with one or more keepers appointed by him, shall have the management and charge of all such public domain in that city or town, and within such public domain shall have the powers of constables and police officers in towns. But a town by a vote of two thirds of the legal voters present and voting at an annual town meeting, or a city in which the city council consists of two branches, by a vote of two thirds of the members of each branch, and a city in which there is a single legislative board, by a vote of two thirds of the members thereof present and voting thereon, may place all such public domain within its limits under the general supervision and control of the state forester, who shall thereupon, upon notification thereof, make regulations for the care and use of such public domain and for the planting and cultivating of trees therein, and the city or town forester in such case and

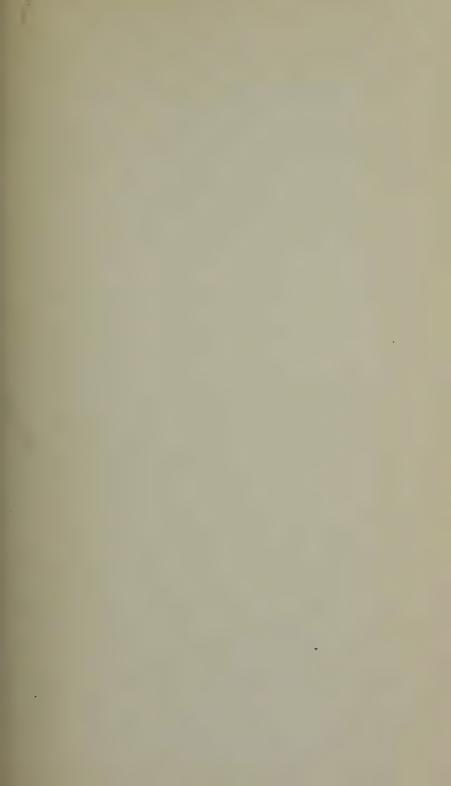
his keepers, under the supervision and direction of the state forester, shall be charged with the duty of enforcing all such regulations and of performing such labor therein as may be necessary for the care and maintenance thereof; and within such public domain shall have the powers of constables and police officers in towns.

Section 3. Said chapter twenty-eight is hereby further amended by striking out section twenty-six and inserting in place thereof the following: — Section 26. Any such city or town may lease any building on a public domain, and shall apply all sums derived from rents or from the sale of the products of any such domain, so far as may be necessary, to the management thereof.

Section 4. Said chapter twenty-eight is hereby further amended by striking out section twenty-seven and inserting in place thereof the following: — Section 27. Any city or town in which such public domain is situated may erect thereon any building for public instruction or recreation: provided, that if such public domain has been placed under the supervision and control of the state forester, under the provisions of this act, no such building shall be erected unless his approval shall first be obtained.

Section 5. Said chapter twenty-eight is hereby further amended by striking out section twenty-nine and inserting in place thereof the following: — Section 29. For the purpose of defraying the expenses incurred under the provisions of the six preceding sections any city or town may issue from time to time, and to an amount not exceeding the sum actually expended for the taking or purchase of lands for such public domain, bonds or notes. Such bonds or notes shall be denominated on the face thereof. , Public Domain Loan, Act of 1913; City or Town of shall be payable by such annual payments, beginning not more than one year after the date thereof, as will extinguish each loan within thirty years from its date; and the amount of such annual payment of any loan in any year shall not be less than the amount of the principal of said loan payable in any subsequent year. Each authorized issue of bonds or notes shall The bonds or notes shall bear interest at a constitute a separate loan. rate not exceeding four and one half per cent per annum, payable semiannually; and shall be signed by the treasurer and countersigned by the mayor of the city or, in the case of a town, shall be signed by the treasurer and countersigned by the selectmen. The city, by its mayor and treasurer, and the town, by its selectmen and treasurer, may sell such bonds or notes at public or private sale, upon such terms and conditions as they may deem proper, but the bonds or notes shall not be sold for less than their par value; and the proceeds shall be used only for the purposes herein specified.

Section 6. The city or town shall at the time of authorizing said loan or loans provide for the payment thereof in accordance with the foregoing provisions of this act; and when a vote to that effect has been passed by the city council, or at any annual town meeting, a sum which will be sufficient to pay the interest as it accrues on the bonds or notes issued as aforesaid by the city or town, and to make such payments on the principal as





The main street at Nantucket. We think of the island of Nantucket as lacking in tree growth. It is largely a question of soil and wind protection. It is believed that with wind breaks of the hardier growing species, and by taking advantage of natural shelters, much of the island could be gradually reforested.



Spraying tall trees in the Taunton public square with the solid stream highpower sprayer, which was brought out originally by this department. Most of the principal towns and cities where the gypsy and brown-tail moths prevail have these power sprayers.

may be required under the provisions of this act, shall, without further vote, be assessed by the assessors of the city or town annually thereafter, in the same manner in which other taxes are assessed, until the debt incurred by said loan or loans is extinguished.

SECTION 7. This act shall take effect upon its passage. [Approved April 26, 1913.

FINANCIAL STATEMENTS.

General Forestry.

In accordance with section 6, chapter 409 of the Acts of 1904, as amended by section 1, chapter 473, Acts of 1907, the following statement is given of the forestry expenditure for the year ending Nov. 30, 1913:—

	State	Fore	ster's	Expe	nses.				
Appropriation for 1913,								\$20,000	00
Expenditures: —									
Salaries of assistants,						\$7,631	69		
Traveling expenses,						3,246	84		
Stationery and postage,	etc.,			1.		708	13		
Printing,						723	72		
Maps,						198	15		
Equipment,					• 1	246	87		
Sundries,						285	30		
Nursery account: —									
Pay roll,						5,231	10		
						59	61		
Equipment,						700	68		
Teaming, express and fr	eight	, .				715	39		
Telephone, water, gasol						252	25		
			,					19,999	73
Palance returned to									
Balance returned to									
	o trea	sury,			•				
Purcho	o trea use an	sury,	enting	of F	orest	Lands.		\$0	27
Purche Appropriation for 1913,	o trea use an	sury,	enting	of F	orest	Lands.		\$0	27
Purche Appropriation for 1913, Expenditures: —	o trea use an	sury,	nting	of F	orest	Lands.		\$0	27
Purche Appropriation for 1913, Expenditures: — Pay roll,	o trea	sury,	nting	of F	orest	Lands	35	\$0	27
Purche Appropriation for 1913, Expenditures: — Pay roll,	o trea	sury,	enting	of F	orest	Lands. 	35 04	\$0	27
Purche Appropriation for 1913, Expenditures:— Pay roll, Travel, Tools and equipment,	o trea	sury,	enting	of F	orest	Lands. \$6,604 480 324	35 04 54	\$0	27
Purche Appropriation for 1913, Expenditures:— Pay roll, Travel, Tools and equipment, Express and teaming,	o trea	sury,	enting	of F	orest	Lands. \$6,604 480 324 288	35 04 54 78	\$0	27
Purche Appropriation for 1913, Expenditures:— Pay roll, Travel, Tools and equipment, Express and teaming,	o trea	sury,	enting	of F	orest	Lands. \$6,604 480 324 288 2,138	35 04 54 78 75	\$0	27
Purche Appropriation for 1913, Expenditures:— Pay roll, Travel, Tools and equipment, Express and teaming, Land, Stationery and postage,	o trea	sury,	nting	of F	orest	\$6,604 480 324 288 2,138 141	35 04 54 78 75 03	\$0	27
Purche Appropriation for 1913, Expenditures:— Pay roll, Travel, Tools and equipment, Express and teaming,	o trea	sury,	nting	of F	orest	\$6,604 480 324 288 2,138 141	35 04 54 78 75 03	\$0	27
Purche Appropriation for 1913, Expenditures:— Pay roll, Travel, Tools and equipment, Express and teaming, Land, Stationery and postage,	o trea	sury,	nting	of F	orest	\$6,604 480 324 288 2,138 141	35 04 54 78 75 03	\$0	00

Prevention of Forest Fires	Prez	ention	of i	Forest	Fires
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Pr	even	tion	of F	rest	Fires	3.			
Appropriation for 1913,						. \$20,000	00		
Receipts: —						ĺ			
Spofford estate,						. 200	00		
Protest on Spofford chec	k,					. 1	35		
Wm. D. Sohier,						. 400	00		
Town of Wakefield, .						. 350	00		
Town of Halifax,			:			. 50	00		
Town of Plympton, .			•			. 75	00		
Town of Hanson,						. 100	00		
Town of Duxbury,						. 100	00		
Town of Whitman,						. 75	00		
Town of Hanover,						. 100	00		
Town of Marshfield,						. 50	00		
Town of Bourne,						. 300	00		
Town of Wareham,						. 150	00		
Town of Sterling,						. 18	75		
Town of Dunstable,						. 11	81		
Town of Ashland,							50		
Wm. D. Sohier, agent, .						. 500	00		
Town of Upton,						. 12	50		
New England Telephone	and	Tele	grap	h Co	m-				
pany,							23		
Expenditures: —								\$22,506	14
0.1						. \$11,301	60		
era 1		•	•	•	•	. 4,262			
Travel,	•	•	•	•	•	. 538			
Stationery and postage,		•	• •	•	•	256			
Equipment,		•	•	•	•	. 2,568			
Construction,		•	•	•	•	. 2,300			
		•	•	•	•	. 1,275			
Telephone,		•	•	•	•		51		
* /	•	•	•	•	•	. 365			
Sundries,		•	•	•	•	. 300	34	22 505	06
								22,505	90
Balance returned to	trea	asury	7,					\$0	18

Suppression of Gypsy and Brown-tail Moths.

Reimbursement for fire-fighting apparatus to towns, . . \$5,012 48

The balance shown on the general appropriation for the suppression of the gypsy and brown-tail moths, as carried at the end of the fiscal year, will be all practically expended in reimbursements to towns and cities for the work of the year ending Nov. 30, 1913.

General Appropriation.

Balance on hand Nov. 30, 1912, \$103,174 (Less reimbursement due for 1912, 61,016 (00 06 —
Balance for 1913 work, \$42,157 9	4
Receipts: —	
Appropriation for 1913 (made in 1912),	00
Town of Easton,	33
Town of West Bridgewater,	4
City of Lowell,	.4
Town of Andover,	3
Town of Hingham,	.8
City of Medford, 411 8	5
Town of Lexington,	3
Town of Arlington,	3
Town of Stoneham,	
Town of Westwood, 600 0	
Town of Milton, 800 0	0
Appropriation for 1913,	
Town of Milton,	
Town of Milton,	
Town of Walpole, 600 0	0
Town of Walpole,	8
For old truck sold,	0
For old truck sold,	
For motor cycles sold,	
Town of Winchester,	
Adams Express Company	
Adams Express Company,	_
Special North Shore Fund,	
Purchase and planting of forest lands, 6 5	
State Forester's expenses,	
Prevention of forest fires, 4 1	
Dover gypsy moth fund,	
Howe & French (paid in error),	
Town of Holliston,	
Town of Millis,	
The same of 3T 4' 1	
M CTT 1' 1	
Town of Hopkinton,	- \$335,380 58
Amount carried forward,	\$335,380 58

Amount brought for	rward,							\$335,380	58
Office expenses: —									
Salaries of clerks, .						\$2,741	59		
Rent of offices, .						2,139			
Rent of offices, . Stationery and postage	e , .					919			
rimmig						840	09		
Expert's services, .						125	00		
Office and laboratory s						278	18		
Forester's supplies,						66	67		
						40	91		
Sundries,						864	81		
Field expenses: —									
Wages of employees,						28,688	83		
Traveling expenses,						8,300	83		
Tools and supplies,						120,463	68		
Special work,						14,700	00		
Rent of supply store,						749			
Rent of supply store, Supply store equipmen	t, .					87	45		
Sundries, including tea	ming,					754	33		
Reimbursement towns						32,060	21		
					-			213,822	48
Balance on hand I	Tor 20	1012						@101 EE0	10
Dalance on hand I	Nov. ou	, 1910),)19	· and	Ton		11	\$121,000	10
Reimbursement paid I								18 171	60
for the year 1913,								48,471	60
for the year 1913,		•	•	٠	•			48,471	60
for the year 1913, Receipts: —	 Special	North	Sho	ore F	\cdot $fund$	•	٠	48,471	60
for the year 1913, Receipts: — Balance from 1912,	· · · · · · · · · · · · · · · · · · ·	North	. Sho	ore F	iund i		٠	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme	Special	North	. Sho	ore F	iund i		05	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improvement port,	Special ent Asso	North . ociatio	Sho	· re F Roc	iund i		05	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For	Special	North . ociatio	Sho	· Pre F Roc	· · · ck- ·	\$3,682 500 500	05 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport,	Special ent Asse ester,	North cociatio	Sho	re F	· Jund · ck- · ·	\$3,682 500 500 500	05 00 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com	Special Ent Asso ester, apany r	North cociatio	Sho	re F	· 'und · ck- · ·	\$3,682 500 500 500	05 00 00 00 60	48,471	60
Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State Fore	Special	North cociatio	Sho	Roo	Fund ck-	\$3,682 500 500 500 1,200	05 00 00 00 60 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State Fore Town of Rockport, Whitcomb Carter Com F. W. Rane, State Fore W. D. Sohier, agent,	Special	North cociation	Sho	Roce	Fund ck-	\$3,682 500 500 500 1,200 1,200	05 00 00 00 60 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State Fore Town of Rockport, Whitcomb Carter Com F. W. Rane, State Fore W. D. Sohier, agent,	Special	North cociation	Sho	Roce	Fund ck-	\$3,682 500 500 500 1,200 1,200 5,000	05 00 00 00 60 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State Fore Town of Rockport, Whitcomb Carter Com F. W. Rane, State Fore W. D. Sohier, agent,	Special	North cociation	Sho	Roce	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000	05 00 00 00 60 00 00 00	48,471	60
Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent,	Special	North cociation cefund .	Sho	Roo	rund ck-	\$3,682 500 500 500 1,200 1,200 5,000 10,000 10,000	05 00 00 00 60 00 00 00 00	48,471	60
Receipts: — Balance from 1912, South End Improveme port,	Special	North cociation refund,	Shoon of	Roome F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 5,000 5,000	05 00 00 00 60 00 00 00 00 00	48,471	60
Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent, City of Beverly, J. D. Barnes, for spray	Special	North cociation refund,	Shoon of	Roome F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 5,000 300	05 00 00 00 60 00 00 00 00 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent, City of Beverly, J. D. Barnes, for spray State Forester's expens	Special	North cociation refund,	Shoon of	Roome F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 5,000 300 153	05 00 00 00 00 00 00 00 00 00 00 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent, City of Beverly, J. D. Barnes, for spray State Forester's expens Pump and engine sold,	Special	North cociation refund,	Sho	Rooman F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 5,000 300	05 00 00 00 00 00 00 00 00 00 00 00 00	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent, City of Beverly, J. D. Barnes, for spray State Forester's expens Pump and engine sold, Transfer from appropri	Special	North cociation cefund cefund cefund cefund cefund cefund cefund cefund	Sho	Rooman F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 5,000 300 153 85	05 00 00 00 60 00 00 00 00 00 00 00 00	48,471	60
Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent, City of Beverly, . J. D. Barnes, for spray State Forester's expens Pump and engine sold, Transfer from appropring gypsy and brown-tain	Special	North cociation defund	Sho	Rooman F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 10,000 5,000 300 153 85 1,306	05 00 00 00 60 00 00 00 00 00 00 00 30	48,471	60
for the year 1913, Receipts: — Balance from 1912, South End Improveme port, F. W. Rane, State For Town of Rockport, Whitcomb Carter Com F. W. Rane, State For W. D. Sohier, agent, Town of Manchester, F. W. Rane, State For W. D. Sohier, agent, City of Beverly, J. D. Barnes, for spray State Forester's expens Pump and engine sold, Transfer from appropri	Special	North cociation defund	Sho	Rooman F	· · · · · · · · · · · · · · · · · · ·	\$3,682 500 500 500 1,200 1,200 5,000 10,000 5,000 300 153 85	05 00 00 00 60 00 00 00 00 00 00 00 30	48,471 \$41,854	

12 91

843 01

374 92

57 32

532 23

2,711 66

8 40

89 23

301 86

779 22

361 94

2,461 24

3,727 66

1,964 62

1,855 53

626 92

854 12

798 24

286 74

2 00

1,542 04

1,040 94

24

Bedford, 1.

Berkley, .

Billerica, .

Boxborough,

Boxford, .

Boylston, .

Braintree, 1

Bridgewater, 1

Burlington, 1

Canton, .

Chelmsford,

Cohasset, .

Concord, .

Danvers, .

Dedham, 1

Dunstable,

Duxbury, .

Dover.

Dracut,

Carlisle.

Carver,

Berlin,

Bolton,

Amount brought forward, .	\$41,854 6	7
Expenditures: —		
Wages of employees,	\$18,944 98	
Traveling expenses,		
	310 00	
Supplies,		
Sundries, including teaming, etc.,	*	
Storehouse equipment,		
Stationery and postage,		
	95	
Office supplies,		11
	31,009 8	1
Balance on hand Nov. 30, 1913		- '6
	-	
The following is a list of to	wns and cities, with amount of	of
supplies for moth work furnish	ed for the year ending Nov. 30	0.
1913: —	Ter one your carries and the	,
1915: —		
Acton, 1	Easton,	50
Andover, 911 31	Essex,	56
Arlington, 1 2,330 99	Fitchburg, 1	87
Ashburnham, 209 75	Georgetown, 454	95
Ashby, 174 17	Gloucester, 213	83
Ashland, 1 1,564 72	Greenfield, 2	01
Avon, 47 80	Groton, 535	07
Ayer, 1 1,804 80	Groveland, 193	
TO 10 1 1	TT 110	0.4

3,057 36

43 80

237 52

603 61

337 96

584 29

429 81

118 28

2,355 76

1,684 75

2,020 54

772 83

460 29

246 92

638 82

2,447 58

672 17

614 28

3 20

320 54

140 24

269 08

3,410 81

Halifax, .

Hamilton,

Hanover, .

Hanson, .

Harvard, .

Haverhill,

Holden.

Hingham, 1

Hopkinton,

Hudson, .

Ipswich, .

Kingston, .

Lexington, 1

Lincoln, 1 .

Littleton, 1

Lunenburg, 1

Lynnfield, .

Marlborough,

Marshfield,

Mashpee, .

Maynard, 1

Medfield, .

Medford, .

¹ Received sprayers from the State, agreeing to pay one-half the cost.

106	THE	STATE	FORESTER.		[Jan.
Merrimac, .		\$215 10	Shrewsbury, .		. \$38 81
Methuen,		907 65	Southborough, 1		. 1,459 70
Middleborough,		681 09	Sterling,		. 336 75
Middleton, .		301 09	Stoneham, .		. 688 48
Milton, 1		4,302 76	Stow,	,	. 403 49
Natick,		87 80	Sudbury		. 455 90
Newbury, Newton,		581 79	Templeton,		. 1 69
Newton,		9,849 28	Tewksbury,		. 598 20
Norfolk,		111 58	Topsfield,		. 194 85
North Andover,		538 20	Townsend, .		. 286 69
North Reading,		1,344 45	Tyngsborough, 1		. 2,228 41
Northborough, 1		1,492 33	Waltham,		. 1,779 26
Norwell,		1,021 27	Wayland,		. 766 15
Pembroke, .		63 60	Wakefield, .		. 829 68
Pepperell,		422 93	Wellesley		. 3 50
Plympton, .		134 08	Wenham, 1		. 1,589 19
Princeton, .		1 80	West Bridgewater,		. 277 02
Quincy,		1.146 64	West Newbury,		. 318 45
Raynham, .		61 23	Westborough, 1.		. 1,850 17
Reading,		1,464 88	Westford	• /	. 1,046 41
Rochester, .		29 35	Westminster, .	• /	. 102 56
Rowley,		246 50	Weston, 1	•	. 3,700 90
Royalston, .	•	3 90	Weymouth, 1 .	•	. 2,360 53
Salisbury,		304 22	Wilmington, 1 .	•	. 2,586 52
Sandwich, .		139 99	Winchendon, .	•	. 179 17
Saugus,		763 79	Wilbraham, .	•	. 39
Scituate, 1.		4,511 70	Woburn,		. 1,418 76
Sherborn,		333 55	Woburn,	•	. 1,110 10
Shirley,		313 83			\$110,273 76
omitoy,		010 00			Q110,210 TO
Dover gypsy moth f	und				111 20
Forestry departmen					48 63
Forest fire prevention					16 99
Thinning work equi	nment. · .				78 19
Thinning work equip Special North Shore	Fund.		• •		7,644 06
			• • •		173 25
				•	6 58
Reforestation, . Traveling pump,					14 63
Traveling sprayer, (1)	• •	• • •		18 50
Traveling sprayer, (2), .				393 14
Traveling sprayer, (•	572 41
Traveling sprayer, (196 51
Traveling sprayer, (182 09
Traveling sprayer, (• • •		75 00
Traveling sprayer, (• • •		476 48
Traveling sprayer, (612 27
Traveling sprayer, (0), .		• • •		72 50
Traveling sprayer, (· (b				4 37
Truck,	·	A ami audtuma			3 72
United States Depar					402 67
Repairs on automob	iles, .				402 07
					\$121,376 95
					W121,010 00

THE STATE FORESTER

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¹ Received sprayers from the State, agreeing to pay one-half the cost.

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

The following table shows the reimbursement paid to cities and towns for the year 1912, the total net expenditure, the required expenditure before receiving reimbursement from the State, the amount received for work on private property returned to this office, and the amount of reimbursement paid for 1913, and also the required expenditure for 1914. Towns marked with an asterisk received supplies from this office.

		1012		19	13.		1014
CITIES AND TO	WNS	1912. Re- imburse- ment.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Required Expendi- ture.
Abington, .		-	\$1,361 05	-	-	-	\$1,403 51
Acton,		\$997 85*	970 13	\$2,120 13	\$320 44	\$550 00*	975 90
Acushnet, .		-	402 86	-	-	-	439 31
Amesbury, .		-	2,615 03	1,809 64	1,045 60	-	2,626 67
Andover,		_*	2,883 11	2,855 09	1,523 99	-*	3,234 59
Arlington, .		*	5,000 00	4,985 65	1,546 98	_*	5,000 00
Ashburnham, .		104 75*	488 17	919 20	445 19	431 03*	500 72
Ashby,		233 48*	239 32	506 52	69 50	271 97*	248 18
Ashland,		243 78*	585 00	570 61	270 96	*	600 12
Athol,		-	2,216 99	-	-	-	2,342 62
Attleborough, .		- 1	5,000 00	-	-	-	5,000 00
Auburn,		- /	554 00	~	-	-	634 80
Avon,		122 02*	414 70	589 90	62 30	175 20*	431 88
Ayer,		-	922 45	1,410 09	67 35	_*	927 85
Barnstable, .		-	3,175 20	-	-	-	3,370 26
Barre,		-	1,001 02	-	-	-	1,053 58
Bedford,		2,296 80*	667 80	2,661 43	1,781 28	1,393 63*	716 31
Bellingham, .		-	383 65	-	-	-	382 26
Belmont,		-	3,015 78	2,070 04	-	- 1	3,297 49
Berkley,		97 22*	165 77	234 05	57 40	68 28*	208 21
Berlin,	."	1,009 27*	243 10	1,018 89	367 27	775 79*	249 31
Beverly,		-	5,000 00	4,661 05	-	-	5,000 00
Billerica,		854 89*	1,132 00	1,207 41	728 81	75 41*	1,385 80
Blackstone, .		-	948 29	-	-	-	968 97
Bolton,		872 76*	258 98	1,033 93	227 27	774 95*	271 59
Boston,		20,000 00	5,000 00	49,332 73	15,025 52	9,849 89	5,000 00

·	1912.		191	3.		1914.
CITIES AND TOWNS.	Re- imburse- ment.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Required Expendi- ture.
Bourne,	_	\$2,881 49	_	_	_	\$3,057 72
Boxborough,	\$1,321 99*	116 41	\$1,464 91	\$239 28	\$1,348 50*	117 39
Boxford,	2,052 20*	610 32	2,015 65	400 92	1,405 33*	614 49
Boylston,	_*	207 40	734 53	310 67	527 13*	212 0
Braintree,		3,163 39	3,927 33	995 56	_*	3,495 8
Brewster,	-	354 44	_	_	-	325 2
Bridgewater,	. -	1,447 26	2,139 56	211 69	92 30*	1,543 1
Brockton,		5,000 00		-	_	5,000 0
Brookfield,		541 40	_	-	_	545 6
Brookline,	_	5,000 00	_	-	-	5,000 0
Burlington,	1,496 58*	310 18	1,947 98	205 05	1,037 80*	316 4
Cambridge,		5,000 00	-	-	_	5,000 0
Canton	. 686 36*	2,133 36	3,600 86	1,591 25	800 00*	2,543 2
Carlisle,	2,792 25*	191 37	2,741 29	364 03	2,549 92*	199 1
Carver,	489 82*	770 99	1,394 70	591 11	623 71*	790 2
Charlton,	_	522 40	-	_	_	518 9
Chelmsford,	. 500 71*	1,753 60	1,828 15	1,009 28	74 55*	1,785 8
Chelsea,		5,000 00	_	-	_	5,000 0
Clinton,	_	3,632 43	2,469 94		_	3,661 5
Cohasset,	1,011 89*	3,802 02	4,578 72	2,600 54	131 85*	4,417 0
Concord,	1,105 28*	3,372 27	3,998 89	1,825 72	366 87*	3,520 4
Danvers,	1 007 198	2,792 62	3,952 56	1,614 47	805 10*	3,016 5
Dartmouth,	_	1,841 43	_	-	-	2,007 7
Dedham,	_	5,000 00	6,090 84	2,578 71	_*	5,000 (
Dennis,		530 67	_	-	_	545 1
Dighton,		527 86		-	-	548 8
Douglas,		551 50	_	_	-	526 5
Dover,		2,515 57	2,638 12	916 67	97 40*	3,079 8
Dracut,	. 297 32*	1,013 87	1,585 99	1,159 04	576 66*	1,008 0
Dudley,	. _	794 74	_	-	-	825 6
	. 796 71*	170 36	904 14	335 33	733 78*	171 6
Duxbury,	957 70*	1,268 83	1,578 55	824 24	309 72*	1,764 1
T . T . 1	. 56 54*	903 05	578 87	257 55	-	945 6
-	_+	2,408 14	_	-	_*	2,792 8
Essex.	602 21	496 97	1,095 75	402 50	598 78*	501 8
Everett,		5,000 00	1,014 19	-	_	5,000 0
	_	5,000 00				5,000 0

	1912.		191	3.		1914.
CITIES AND TOWNS.	Re- imburse- ment.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Required Expendi- ture.
Fairhaven,	_	\$1,554 84	-	-	-	\$1,631 10
Falmouth,	-	4,718 70		-	- 1	4,341 80
Fitchburg,	_*	5,000 00	-	-	_* .	5,000 00
Foxborough,	-	1,033 04	-	-	- 1	1,059 05
Framingham,	-	5,000 00	\$4,067 73		-	5,000 00
Franklin,	-	1,773 40	-	-	-	1,880 97
Freetown,	-	397 86	-	-	-	407 73
Gardner,	-	4,005 63	- 1	-	-	4,195 02
Georgetown,	\$1,458 48*	498 01	1,595 64	\$734 60	\$1,097 63*	509 37
Gloucester,	1,623 07*	5,000 00	6,872 77	1,971 97	829 48*	5,000 00
Grafton,	-	1,168 22	727 22	250 00	-	1,219 66
Great Barrington,	-	2,536 84	_	- 1	-	2,749 12
Greenfield,	-	4,324 33	- U	-	_*	4,597 02
Groton,	76 95*	1,645 19	1,692 70	379 45	47 51*	1,735 29
Groveland,	920 33*	486 64	1,155 93	292 72	669 29*	492 33
Halifax,	438 40*	260 10	781 79	471 81	521 69*	262 17
Hamilton,	1,035 53*	1,874 57	2,668 86	881 90	400 00*	2,080 78
Hanover,	857 97*	638 09	1,370 22	1,169 59	732 13*	784 20
Hanson,	916 36*	551 32	1,111 05	189 68	559 73*	580 61
Harvard,	533 78*	680 53	1,560 37	938 29	879 84*	702 06
Harwich,	_	595 06	_	_	_	627 67
Haverhill,	_	5,000 00	4,009 55	1,998 35	_*	5,000 00
Hingham,	_*	3,116 37	3,752 18	3,260 55	_*	3,281 43
Holbrook,	_	639 20	' -	_	_	661 97
Holden,	_	712 78	929 92	428 16	217 14*	725 84
Holliston,	_	787 43	_	_	_	807 10
Hopedale,	_	2,365 45	_	_	_	2,388 25
Hopkinton,	*	702 60	1,289 72	440 00	587 12*	727 08
Hubbardston,	_*	307 48	457 81	156 13	150 33	315 47
Hudson.	249 65*	1,618 63	1,818 20	648 83	199 57*	1,659 29
Hull,	_	3,039 23	_	_		3,258 48
Ipswich,	24 40	2,295 12	2,703 75	1,325 40	408 63*	2,196 0
Kingston,	224 05		2,001 61	446 73	1,341 43*	671 9
Lakeville,	_	426 08	_	_	-	464 7
Lancaster,		2,140 57	_	-	_	2,744 5
Lawrence,		5,000 00	1,912 30	_		5,000 00
Leicester,		972 41	1,012 00			1,002 9
		972 41		1		1,002 8

	1912.		191	3.		1914.
CITIES AND TOWNS.	Re- imburse- ment.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Required Expendi- ture.
Lenox,	*	\$3,133 87	_	-	-	\$3,585 22
Leominster,		5,000 00		-	-	5,000 00
Lexington,	. \$2,548 47*	3,242 41	\$6,624 66	\$1,669 33	\$1,723 83*	3,425 04
Lincoln,	. 448 27*	1,615 75	2,136 55	2,064 92	-*	1,751 0
Littleton,	. 876 73*	467 68	1,380 54	99 50	312 86*	477 65
Lowell,		5,000 00	3,165 04	3,752 97		5,000 0
Lunenburg,	. 866 44*	534 53	1,623 79	936 84	489 26*	557 1
Lynn,	*	5,000 00	2,532 69	-	-	5,000 0
Lynnfield,	. 1,189 29*	479 72	2,461 49	514 53	1,981 77*	507 2
Malden,		5,000 00	-	-	-	5,000 0
Manchester,		5,000 00	-	-	-	5,000 0
Mansfield,		1,672 18	-	-	-	1,768 6
Marblehead,		4,079 57	1,633 00	1,547 63	-	3,764 0
Marion,		2,065 46	-	-	-	2,066 8
Marlborough,		4,278 62	4,834 20	2,787 64	141 49*	4,289 7
Marshfield,	. 442 17*	1,064 55	1,723 55	1,188 26	659 00*	1,129 5
Mashpee,	. 750 73*	97 38	1,426 96	110 80	1,328 06*	100 0
Mattapoisett,		798 62	-	- '	-	740 3
Maynard,		1,632 04	2,152 75	313 72	_*	1,637 8
Medfield,		676 33	-	_	_*	726 8
Medford,		5,000 00	3,910 42	2,202 71	_*	5,000 0
Medway,		686 51	-	-	-	688 7
Melrose,		5,000 00	-	-	-	5,000 0
Mendon,		275 44	-	-	-	277 5
Merrimac,	. 1,037 27*	535 89	1,312 69	333 96	776 80*	513 7
Methuen,	. 373 57*	3,194 64	3,621 26	2,552 70	159 77*	3,360 6
Middleborough, .	. 693 12*	1,939 92	2,709 92	945 03	770 00*	1,993 8
Middleton,	. 1,289 32*	354 60	1,403 53	324 40	1,048 93*	364 6
Milford,		3,954 62	-	-	-	4,029 4
Millbury,		1,193 41	-	-	-	1,186 6
Millis,		539 09	147 93	-	-	547 2
Milton,		5,000 00	4,520 46	9,875 27	_*	5,000 0
Nahant,		3,673 72	-	-	-	3,627 1
Natick,	*	3,479 07	3,070 81	1,658 54	_*	3,536 2
Needham,		2,926 47	_1	-	-	3,110 4
New Bedford,		5,000 00	-1	-	-	5,000 0
New Braintree.		161 38	_	_	_	169 2

¹ This town has not yet filed complete account.

	1912. Re- imburse- ment.		1914.			
CITIES AND TOWNS.		Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Required Expendi- ture.
New Salem,	_	\$148 72	-	-	_	\$157 03
Newbury,	\$1,137 70*	627 06	\$1,997 17	\$687 61	\$1,370 11*	604 09
Newburyport,	-	5,000 00	-	-	-	5,000 00
Newton,	2,644 37*	5,000 00	25,032 88	16,942 86	2,000 00*	5,000 00
Norfolk,	236 44*	418 44	549 15	298 20	130 71*	479 03
North Andover,	364 58*	2,211 81	2,309 91	1,025 51	98 10*	2,229 00
North Attleborough, .	-	3,665 74	-	-	-	3,828 41
North Brookfield,	-	753 92	-	- 1	-	765 03
North Reading,	1,928 94*	354 10	2,632 48	780 52	2,278 38*	367 70
Northborough,	789 91*	566 66	1,245 03	383 68	78 37*	738 19
Northbridge,	-	2,086 30	-	-	-	2,210 49
Norton,	-	601 74	-	-	-	675 10
Norwell,	403 35*	446 38	1,035 11	1,470 39	588 73*	462 94
Norwood,	-	5,000 00	-	-	-	5,000 00
Oakham,	-	152 32	-	-	-	151 92
Orange,	-	1,652 94	-	-	-	1,622 09
Orleans,	-	765 33	-	-	-	1,478 52
Oxford,	-	820 58	-	-	-	825 79
Palmer,	-	1,934 07	-	-	-	2,115 60
Paxton,	-*	153 36	-	-	-	158 87
Peabody,	1,685 79	5,000 00	-	-	-	5,000 00
Pembroke,	1,366 09*	390 54	1,846 51	353 76	1,455 97*	434 81
Pepperell,	480 70*	907 45	1,912 19	484 90	1,004 74*	926 75
Petersham,	-	442 07	-	-	-	444 69
Phillipston,	-*	114 78	-	-	-	116 14
Plainville,	-	342 66	-	-	-	414 68
Plymouth,	-	4,886 83	-		-	5,000 00
Plympton,	1,500 53*	166 36	1,670 26	204 83	1,503 90*	174 25
Princeton,	-*	568 21	-	-	*	596 48
Provincetown,	-	915 41	-	-	-	944 17
Quincy,	-*	5,000 00	5,662 91	1,130 40	_*	5,000 00
Randolph,	-	1,092 40	-	-	-	1,129 50
Raynham,	452 11*	354 45	317 03	214 54	*	365 10
Reading,	423 33*	2,618 75	3,151 64	1,997 70	133 33*	2,788 71
Rehoboth,	-	385 80	-	-	-	411 04
Revere,	-	5,000 00	-	-	-	5,000 00
Rochester,	-	379 92	-	-	_*	383 62

Cities and Towns.		1912. Re- imburse- ment.	1913.				1914.	
			Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Required Expendi- ture.	
Rockland,			-	\$1,931 05	-	_	-	\$2,091 52
Rockport,			\$446 56*	1,512 99	\$1,826 71	\$1,192 91	\$313 72	1,563 59
Rowley, .			698 07*	968 80	1,188 87	229 34	220 07*	919 07
Royalston,			_*	278 44	95 36	61 58	_*	288 25
Rutland, .			-	312 59	-	-	-	342 78
Salem, .			-	5,000 00	-	-	-	5,000 00
Salisbury,			1,265 29*	535 99	1,434 90	304 00	898 91*	571 86
Sandwich,			157 79*	473 83	769 64	115 00	295 81*	520 32
Saugus, .			2,956 42*	2,537 20	4,976 05	2,466 83	1,798 32*	2,670 32
Scituate, .			4,046 37*	2,052 80	6,297 85	1,600 00	3,045 05*	2,218 48
Seekonk, .			_	635 77	-	-	-	659 45
Sharon, .			_	1,287 25	-	-	-	1,487 41
Sherborn,			299 13	644 53	792 41	1,203 44	147 88*	892 70
Shirley, .			_*	501 98	542 81	79 80	40 83*	505 28
Shrewsbury,				960 50	-	-	_*	1,001 17
Somerset, .			_	632 85	_	-	-	659 68
Somerville,				5,000 00	662 99	1,709 09	-	5,000 00
Southborough,			682 26*	822 60	1,323 52	987 04	_*	856 04
Spencer, .			-	1,459 18	-	-	_	1,408 47
Springfield,				5,000 00	-	-	-	5,000 00
Sterling, .			*	493 86	490 28	245 19	_*	499 84
Stockbridge,			. -	1,813 78	-	-	-	1,703 57
Stoneham,			_*	2,104 35	2,057 23	1,478 32	_*	2,140 83
Stoughton,			_*	1,557 35	_	-	-	1,610 80
Stow, .			918 38*	424 82	1,204 67	410 25	779 85*	448 54
Sturbridge,			1	407 65	-	-	-	372 80
Sudbury, .			880 62*	544 28	1,722 49	220 83	1,178 21*	558 91
Sutton, .			-	618 05	-	-	-	611 92
Swampscott,			_	4,955 16	4,455 68	_	-	5,000 00
Swansea, .			_	662 11	-	-	-	706 68
Taunton, .			-	5,000 00	_	_	-	5,000 00
Templeton,			_	729 96	-	- 1	_*	734 77
Tewksbury,			594 76*	605 54	1,405 52	687 29	799 98*	645 83
Topsfield,			637 05*	1,243 95	1,581 50	730 56	337 55*	1,427 43
Townsend,			387 20*	538 96	1,620 65	447 88	1,081 69*	546 91
Truro, .			_	157 91	-	-	-	163 22
Tyngsborough,			823 98*	262 14	1,599 63	907 78	737 49*	269 96

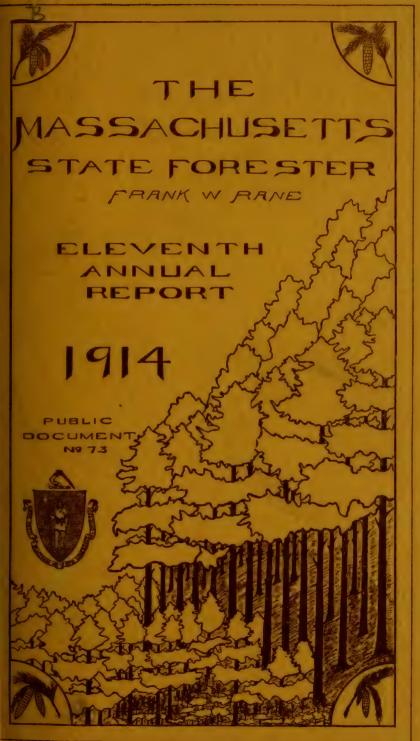
		1913.				
CITIES AND TOWNS.	Re- imburse- ment.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	1914. Required Expendi- ture.
Upton,	. -	\$474 22	-	-	- 1	\$504 47
Uxbridge,	-	1,413 00	-	- 1	- 1	1,503 98
Wakefield,	*	4,372 26	\$1,129 86	\$2,562 65	_*	4,602 40
Walpole,	_*	2,573 82	-	-	-	2,762 19
Waltham,	. \$238 80*	5,000 00	7,297 71	5,875 19	\$259 23*	5,000 00
Wareham,	-	2,212 11	-	-	-	2,218 48
Warren,		840 79	-	-	-	979 44
Warwick,	. -	165 89	-	-	-	182 51
Watertown,	. -	5,000 00	-	-	-	5,000 00
Wayland,	. 710 93*	1,270 83	1,514 16	1,205 00	243 33*	1,214 60
Webster,	. -	3,482 36	-	-	-	2,851 88
Wellesley,	. 370 11	5,000 00	4,624 98	1,351 45	_*	5,000 00
Wellfleet,	. -	407 46	-	-	-	352 84
Wenham,	. 987 04*	1,051 16	1,384 69	610 81	_*	1,064 16
West Boylston, .	. -	378 60	-	-	-	380 42
West Bridgewater, .	*	613 84	1,181 69	378 82	567 85*	621 62
West Newbury, .	. 1,019 34*	423 04	1,375 24	385 85	952 20*	436 80
Westborough,	_*	1,293 07	1,488 64	107 75	_*	1,309 46
Westford,	. 1,429 95*	859 24	1,842 79	537 00	983 55*	882 21
Westminster,	. 130 47*	377 73	987 82	197 03	610 09*	396 36
Weston,	. 615 46*	3,359 89	5,963 61	3,600 00	982 80*	3,248 27
Westport,	. -	883 26	-	-	-	912 68
Westwood,	*	1,641 04	-	-	-	1,640 03
Weymouth,	. 8 99	3,982 86	4,290 61	1,987 02	_*	4,587 23
Whitman,	. -	2,215 37	-	-	-	2,229 69
Wilbraham,	. -	471 26	-	-	_*	489 82
Wilmington,	. 2,052 16*	683 73	2,970 17	894 72	1,686 44*	726 89
Winchendon,	. -	1,683 77	1,831 59	204 11	147 82*	1,720 71
Winchester,	*	5,000 00	3,746 79	-	-	5,000 00
Winthrop,	. -	5,000 00	-	-	-	5,000 00
Woburn,	. 3,025 92	4,660 11	9,550 55	2,069 28	4,628 61*	4,828 12
Worcester,		5,000 00	-	-	-	5,000 00
Wrentham,	. -	560 48	-	-	-	587 68
Yarmouth,		989 19	_		_ 3	1,020 00

SUMMARY OF RECOMMENDATIONS OF THE STATE FORESTER.

- 1. That a more pretentious plan for acquisition and management of lands for use as State forests be given due consideration.
- 2. That legislation be enacted regulating the present slash dangers. Our great losses from forest fires are largely traceable to our indifference in leaving slash where it can be reached by fire.
- 3. That the appropriation for gypsy and brown-tail moths for the coming year be as follows: \$125,000 for the remainder of this year and \$75,000 for use until the Legislature of 1915 may take action.
- 4. That the present method of taxing forest land be so altered as to encourage rather than discourage the practice of forestry in this Commonwealth.

Respectfully submitted,

F. W. RANE, State Forester.





THE

STATE FORESTER

OF

MASSACHUSETTS.

ELEVENTH ANNUAL REPORT,

1914.

F. W. RANE, STATE FORESTER.



BOSTON:

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1915.

STATE MAKE MASH

APPROVED BY
THE STATE BOARD OF PUBLICATION.

634.906103 879n 1914 B

The Commonwealth of Massachusetts.

To the General Court.

The work of the State Forester is herewith reported upon for the past year in accordance with the provisions of chapter 409, section 5, Acts of 1904.

It is with pleasure that I can say that the year has been an extremely busy and successful one, and that the co-operation, not only of the General Court but of our people generally, has been most cordial and of a constructive nature.

Respectfully submitted,

F. W. RANE, State Forester.

DEC. 31, 1914.



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The forest fire observation tower at Hanson. This tower was constructed through the co-operation of the surrounding towns with the State Forester.

The Commonwealth of Massachusetts.

ELEVENTH ANNUAL REPORT OF THE STATE FORESTER.

Introduction.

The granting by the General Court at its last session of an appropriation of \$90,000 for the purchase of State forests, the enactment of both the forest taxation law and regulations for the disposal of slash bordering forestry operations, together with an increased forest fire appropriation, were in themselves sufficient to give encouragement to any State forester.

The season of 1914 to our mind eclipsed all previous ones in undertakings and accomplishments. It is therefore with a great deal of pride and no little pleasure that your State Forester presents this, his annual report, outlining in a general way the activities of this department for the past year. He fully realizes that for whatever progress has been made the credit belongs to no one person, but to the splendid co-operation on the part of the people generally.

"Conservation" has come to be the term that stands for accomplishing something in the economic utilization of our natural resources throughout the nation, and it is an ungrateful citizenship that will not respond to aiding this great and important cause. Our Massachusetts people have awakened to not only talk and advocate conservation, but have gone even farther and enlisted in a campaign of restoration and utilization as well as "conservation." Our State being one of the oldest, and abounding in excellent markets, the forest products have been heavily drawn upon, and hence our forest lands have been rapidly depleted. Now that other and further sources of supply have met with similar experience, the time has come when we must determine our future source of forest products. Upon

turning to a study of forest culture and management we find here in Massachusetts a fertile field for great accomplishments.

During each successive year, of late, we have been the more able to do work that begins to show definite results. Our splendid forest fire protective system in Massachusetts is certainly something of which we may all be proud. Where forest fires a few years ago were allowed to run at will, to-day we aim to detect and extinguish them at once. Our system consists of 26 observation towers scattered over the State, each containing a wide-awake observer, who has telephone connection with forest wardens in each city and town, 353 in all. In addition we have 1,500 deputies, a State Fire Warden with his four assistants, who patrol each section of the State in auto runabouts, and also 300 rural mail carriers whose duty it is to report fires. With this comprehensive system it can be plainly seen that the danger of the destruction of forests by fire is rapidly being overcome.

Next from point of importance to forest fires comes, probably, forest taxation. The past season realized the placing of a rational and workable forest tax law on our statute books. By registering forest land in accordance with the new law any one may have a comprehensive and definite knowledge of what his future forest taxes will be. This law is automatic, and is a safety valve for rational forestry investment. It took six years to secure this forest taxation law, as it necessitated a change in the State Constitution and an acceptance by the people, even before a commission could be appointed to draft and submit the new law to the Legislature.

The new slash law, which takes effect Jan. 1, 1915, requires that all lumbermen, farmers or others who operate wood lots hereafter must remove or destroy all brush or slash for a distance of 40 feet from the highway, railroad or abutting woodland. This law will render conditions far more favorable for handling incipient forest fires. The strip will act as a natural forest fire line.

With the above regulations added to our numerous previous acts, such as the permit act, the forest warden act, the reforestation act, the forest domain act, the town forest fire equipment act, etc., we now have a set of fundamental laws which we may proudly acclaim in their entirety, and which make up what the State Forester chooses to designate as the Massachusetts forest policy. For a fuller discussion in detail the reader is referred to a paper entitled "The Massachusetts Forest Policy," which the State Forester read before the Society for the Promotion of Agricultural Science, at Washington, D. C., on Nov. 11, 1914, and which is reprinted elsewhere in this report.

It has taken eleven years since the creating of the office of State Forester, therefore, to arrive at our present well-rounded-out forestry system. It now behooves us to build up a splendid State forest structure upon this foundation. The energies of the State Forester henceforth will be to explain, simplify and put into practical operation forestry practices of all sorts, and he asks the whole-hearted co-operation of all Massachusetts citizens to that end.

While it has been necessary for the State Forester to go to the Legislature each year for many new laws and special appropriations, it is believed that our future forestry bills will be more spontaneous and come from our people themselves. We have at the present time not only cordial co-operation and interest on the part of the lawmakers themselves, but much interest is shown in the State, city and local organizations of every kind. Examples of these are the Patrons of Husbandry or State Grange; State Board of Agriculture; Federation of Women's Clubs; boards of trade; sportsmen's organizations, etc.

The one organization in particular which has, from its natural affiliations and close association with the State Forester, been of great assistance is the Massachusetts Forestry Association. This organization introduced the bill creating this office, and the development of forestry interest throughout Massachusetts can be gauged by the great increase in membership of this association alone. A few years ago a membership of 800 was pointed to with pride, while the past year its membership totaled 3,200. This organization is not only interested in modern forestry development, as, for example, in offering a prize for a competition in municipal forest planting of 50,000 young trees to the winner this next spring, but the association

is also deeply interested in roadside trees and shade trees of all kinds. Last spring a great deal of interest was aroused in a competition by various cities and towns over roadside tree planting, and the winning town was given the trees and the expense of planting two miles of roadsides. It is needless to point out that this work popularizes forestry and educates our citizens, and particularly the coming generation, to appreciate trees and forestry.

Under the head of "Forest Management," which is treated more in detail in this report, the department has made 58 examinations which cover a total area of 13,255 acres. Working plans, making forest fire lines and mapping work have also come under this head.

The department has again increased its nursery work by establishing a new nursery at Barnstable, Mass., which will be used largely for growing seedlings. This nursery, in conjunction with our old one at Amherst, will supply us with sufficient stock to meet our increased demands. The new seed beds at the Barnstable nursery contain as fine a stand of seedlings as the writer has ever seen. A transplant nursery has been started on the grounds of the State Farm at Bridgewater, and it is our purpose to greatly enlarge this acreage in the spring. A large amount of nursery stock was given to various State institutions for planting upon their holdings the past year.

The practice of aiding towns and cities from the State appropriation, in getting better and more permanent equipment for use in work against the gypsy and the brown-tail moths, has been followed throughout the past season, with the result that they are in a position to do far more effective work in the future, and at less expense. Where this office is getting proper co-operation from cities and towns (and this is quite general) the moth work is constantly improving.

Now that the United States Department of Agriculture has for the past two years assumed the work of checking the spread of the gypsy moth, and also taken over the parasite work, our State work has become more specific and definite. Each year a number of towns and cities that have been having State aid are added to the list of those self-supporting. Such cities and towns, now that they have had assistance and are in a position to

handle their work within their liability, should be compelled hereafter to keep it up to this standard of efficiency. The State appropriation for the coming year is needed in aiding those towns that in the past have had scattering infestations which now have become very general. As long as there are but a few insects little co-operation is forthcoming, but when the stripping stage is reached then people begin to realize the danger.

During the past year, at a request from the United States Department of Agriculture, a number of towns situated just within the so-called border towns now being handled by that department were scouted and given special consideration. As the government is faithfully attempting, at great expense, to check the spread into new territory, it was thought a wise expenditure of State funds to thus co-operate. During the coming year the central and north cape country will need a great deal of attention.

The forest-thinning method of handling the moths, whereby the trees preferred by them are removed, and resistant species retained, and even planted, has proved, with spraying, a great success. Many woodland owners are taking advantage of this practice, and we predict that as rapidly as markets can be worked up for the products removed this work will just as rapidly increase. This work has not only the advantage of permanency, but it brings about a more economic forestry condition for the future. The subject is discussed more fully elsewhere in this report.

Briefly, therefore, the moth suppression work is being handled with a definiteness of purpose, and that real gains are being made there is no doubt. The work should be continued along our present lines, taking advantage of every method or combination of methods that will get results economically.

This report itself contains much else in detail about forestry in general, and our moth work, and by this introduction it is hoped the reader may be interested to look more deeply into our various activities.

ORGANIZATION.

During the year there have been a few changes, but generally speaking the personnel of the staff has remained the same.

Mr. R. S. Langdell, who has been an assistant in charge of

reforestation work for seven years, resigned last spring to engage in commercial forestry work. He has become one of the firm of the Franklin Forestry Company, and has charge of their reforestation work. Mr. Langdell was first employed to take charge of the nursery work, and to him is due the credit for the splendid success that we have had in growing seedlings and transplants for our State work. It was with reluctance that we accepted his resignation. Mr. Langdell's work has been for the time being placed under the supervision of Mr. H. O. Cook, while Mr. J. R. Simmons, a young man who was employed as a college forestry student from Syracuse University during the summer of 1912 on forest mapping, was hired to have charge of the nursery work.

Mr. Roy G. Pierce, M.F., who became a member of the staff as assistant in charge of chestnut blight work, in co-operation with the United States Department of Agriculture, and had been with us for over a year, finished his duties with us at the completion of the term of agreement, July 1, and returned to Washington, D. C. Mr. Pierce proved an enthusiastic worker, and did very much to acquaint our people with the chestnut disease and methods of handling it.

Mr. Ray Weston, M.F., was employed during the year to assist Mr. Kneeland in the forest thinning work for controlling moth suppression.

The remainder of the organization is practically the same as last year, with slight alterations.

The organization follows: -

GENERAL STAFF.

F. W. RANE, B.Agr., M.Sc	. ,	State Forester.
C. O. BAILEY,		Secretary.
ELIZABETH HUBBARD,		Bookkeeper.
JOSEPHA L. GALLAGHER,		Clerk.
ELIZABETH T. HARRAGHY,		Stenographer.
JENNIE D. KENYON, .		Stenographer.
JAMES H. CROWLEY,		Office boy.

GENERAL FORESTRY.

F. W. RANE, B. Agr., M.Sc.,	State Forester.
Н. О. Соок, М.Г.,	Assistant Forester.
F. L. HAYNES, B.F.,	Forest examiner.
J. R. SIMMONS, B Sc., .	Reforestation work.
HAROLD FAY, M.F.,	Forest mapping.

EBEN SMITH, Superintendent, Barnstable Nursery.

DEAN TOWNSLEY, Superintendent, Amherst Nursery.

J. L. PEABODY, Field foreman.

JAMES MORRIS. Field foreman.

H. N. BUTLER, Field foreman.

H. G. TAYENER, Field foreman.

H. H. CHASE, Field foreman.

STAFF, MOTH WORK.

F. W. RANE, B.Agr., M.Sc. . State Forester.

GEO. A. SMITH. . . . Assistant (equipment, accounts, etc.).
PAUL D. KNEELAND, M.F., . Assistant (woodlands, products, etc.).

JOHN MURDOCH, JR., A.M., Assistant.
RAY F. WESTON, M.F., Assistant.
FRANCIS V. LEAROYD, Clerk.

DISTRICT MOTH MEN.

1. John W. Enwright, Medford. 5. Harry B. Ramsey, Worcester.

2. SAUL PHILLIPS, Beverly. 6. C. W. PARKHURST, Medfield.

3. JOHN J. FITZGERALD, Haverhill.
4. WM. A. HATCH, Marlborough.
5. W. F. Holmes, East Braintree.
8. J. A. FARLEY, Plymouth.

STAFF, FOREST FIRE PREVENTION.

F. W. RANE, B.Agr., M.Sc., State Forester.

M. C. HUTCHINS, . . . State Fire Warden.

MINER E. FENN, . . . Assistant.

JAMES E. MOLOY, . . Locomotive inspector.

DISTRICT FOREST WARDENS.

1. OSCAR L. NOYES, Byfield.

3. John P. Crowe, Westborough.

2. J. J. SHEPHERD, Pembroke.

4. ALBERT R. ORDWAY, Westfield.

OBSERVERS.

District 1.

WM. BRAY, Georgetown.
GEO. G. CALVERT, Sharon.
J. FRANK HAMMOND, Chelmsford.
ELLIOT C. HARRINGTON, Milton.
CAPLIS McCORMICK, Essex.
JOHN H. O'DONNELL, Wakefield.

District 2.

CALVIN BENSON, Barnstable.
WALTER H. BLAKE, Dighton.
FRANK L. BUCKINGHAM, Plymouth.
ALVARO HARNDEN, Fall River.
S. MATTHEWS, Middleborough.
CALVIN C. PARKER, North Harwich.
W. F. RAYMOND, Bournedale.
CUSHING O. THOMAS, South Hanson.
W. I. MOODY, Falmouth.

District 3.

A. M. BENNETT, Pelham.
JOHN GIBLIN, Westborough.
J. H. LOMBARD, Warwick.
JAMES MALEY, Princeton.
GEO. W. SHERMAN, Brimfield.

District 4.

C. M. Brown, Ashfield. H. H. Fitzroy, Savoy. Chas. F. Kimball, Becket. GEO. C. Miller, Easthampton. Nelson C. Woodward, Shelburne.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.

[Alphabetically by towns and cities.]

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
57-W, Rockland, .	Arthur B. Reed,	Abington,	C. F. Shaw,	7
10-4,	W. H. Kingsley,	Acton,	J. O'Neil,	4
2003-М,	Henry F. Taber,	Acushnet,	A. P. R. Gilmore,	8
2-0, Kippers, .	John Clancy,	Adams,	John Clancy, .	5
1431-М,	E. M. Hitchcock,	Agawam,	-' -	1 -
151-32, Great Bar-	J. H. Wilcox, State Line,	Alford,		-
rington. 274-M,	James E. Feltham,	Amesbury,	A. L. Stover, .	3
174-Y,	A. F. Bardwell,	Amherst,	W. H. Smith, .	5
212,	John H. Baker,	Andover,	J. H. Playdon, .	3
35 or 206,	Walter H. Pierce,	Arlington,	Daniel M. Daley, .	1
2-12,	J. T. Withington,	Ashburnham, .	Chas. H. Pratt, .	4
24-2,	Wm. S. Green,	Ashby,	Fred C. Allen, .	4
4-12,	Chas. A. Hall,	Ashfield,		-
4 79-W,	Horace H. Piper,	Ashland,	Theodore P. Hall,	6
48-J or 72-4, .	Frank P. Hall,	Athol,	W. S. Penniman, .	5
34-4,	Hiram R. Packard, .	Attleborough, .	W. E. S. Smith, .	6
5-17,	J. F. Searle,	Auburn,	J. F. Searle,	5
3259-М,	J. W. McCarty,	Avon,	W. W. Beals, .	7
96-4 or 47-4,	Chas. E. Perrin,	Ayer,	D. C. Smith, .	4
144-2,	Henry C.Bacon, Hyannis,	Barnstable, .	F. W. Chase, .	8
83-4,	A. E. Traver,	Barre,	G. R. Simonds, .	5
18 or 8000,	P. B. McCormick,	Becket,		-
117-1 Lex.,	Chas. E. Williams,	Bedford,	W. A. Cutler, .	1
10-2,	Jas. A. Peeso,	Belchertown, .	E. C. Howard, .	5
8157-22, Milford, .	L. Francis Thayer,	Bellingham, .	H. A. Whitney, .	6
409-W,	John F. Leonard,	Belmont,	C. H. Houlahan, .	1
1367-М,	G. H. Babbitt, Taunton, R. F. D.	Berkley,	A. A. Briggs, .	6
14-6,	Walter Cole,	Berlin,	E. C. Ross,	4
2-13,	Edson W. Hale,	Bernardston, .	Edwin B. Hale, .	5
319-Ј,	Robert H. Grant,	Beverly,	J. B. Brown, .	2
22-2,	E. N. Bartlett,	Billerica,	W. H. O'Brien, .	1
875-L-1, Woon-	Thomas Reilly,	Blackstone, .	A. J. Gibbons, .	5
socket. 12-2,	I. E. Whitney,	Blandford,		
9-14,	E. Eliot Hurlbut,	Bolton,	C. E. Mace,	4
		Boston,	Park and Recreation Department.	1
103-13,	Emory A. Ellis, Bournedale.	Bourne,	Edward D. Nick- erson.	8

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
No telephone, .	H. J. Livermore,	Boxborough, .	C. E. Sherry, .	4
42-21, George-	Harry L. Cole, George- town, R. F. D.	Boxford,	C. Perley,	3
town. 4-4,	John N. Flagg,	Boylston,	R. B. Smith,	5
433-R,	Jas. M. Cutting, South	Braintree,	Clarence R. Bes-	7
No telephone, .	Braintree. T. B. Tubman,	Brewster,	Russell D. Eaton,	8
8-6,	Edwin S. Rhoades,	Bridgewater, .	F. C. Worthen, .	7
14-3,	Geo. E. Hitchcock,	Brimfield,	G. E. Hitchcock, .	5
1041 or 2020, .	Harry L. Marston,	Brockton,	Geo. C. Kane,	7
101-13,	Elbert L. Bemis,	Brookfield,	J. H. Conant, .	5
376,	Geo. H. Johnson,	Brookline,	Ernest B. Dane, .	1
52-8,	Gilbert E. Griswold, .	Buckland,		_
No telephone, .	W. W. Skelton,	Burlington, .	W. W. Skelton, .	1
51-4,	Robert C. Hughes,	Canton,	A. Hemenway,	7
		Cambridge, .	J. F. Donnelly, .	1
76-5, Concord, .	Geo. G. Wilkins,	Carlisle,	G. G. Wilkins, .	1
16-2,	Herbert F. Atwood, .	Carver,	H. F. Atwood, .	8
14-12,	Albert L. Veber,	Charlemont, .		_
32-22,	Chas. S. McKinstry,	Charlton,	J. D. Fellows, .	5
28-3,	Geo. W. Ryder, West	Chatham,	Mervyn R. Martin,	8
1597-R, Lowell, .	Chatham. Arnold C. Perham,	Chelmsford, .	M. A. Bean,	1
		Chelsea,	J. A. O'Brien,	1
167-3,	Chas. D. Cummings, .	Cheshire,		_
7-4,	Wm. E. Major,	Chester,		-
4,	Chas. A. Bisbee, Bisbees,	Chesterfield, .		-
149-M or 149-W, .	John E. Pomphret,	Chicopee, . ' .	Z. Pilland,	5
216-14,	Ernest C. Mayhew, .	Chilmark,	A. S. Tilton,	8
No telephone, .	Danforth Blanchard,	Clarksburg, .	Geo. Tisdale, .	5
551-M,	North Adams, R. F. D. Patrick H. Kelley,	Clinton,	John B. Connery,	4
177-3 or 260, .	Wm. J. Brennock,	Cohasset,	Wm. H. McArthur,	7
13-9,	E. H. Temple, Shattuck-	Colrain,	Edgar F. Copeland,	5
75-3,	ville. Frank W. Holden,	Concord,	H. P. Richardson,	4
5-3,	Edgar Jones,	Conway,		_
8001,	Thos. A. Gabb,	Cummington, .		-
42-12,	S. L. Caesar,	Dalton,		-
No telephone, .	Thos. L. Thayer, North	Dana,	T. L. Thayer,	5
295-W,	Dana. Michael H. Barry,	Danvers,	T. E. Tinsley,	2
14-3, Westport, .	Ezekiel W. Reed, North Dartmouth.	Dartmouth,	E. M. Munson, .	8

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
35-R,	H. J. Harrigan,	Dedham,	J. T. Kennedy, .	7
273-14, Greenfield,	Wm. L. Harris,	Deerfield,	Wm. L. Harris,	5
No telephone, .	Chas. E. Pierce, South	Dennis,	H. H. Sears,	8
29-3,	Dennis. Ralph Earle,	Dighton,	D. F. Lane,	6
11-4,	Wm. L. Church,	Douglas,	F. J. Libby,	5
372-3,	John Breagy,	Dover,	H. L. MacKenzie,	6
3353-2,	Frank H. Gunther, .	Dracut,	T. F. Carrick,	1
152-2, Webster, .	F. A. Putnam,	Dudley,	Frank W. Bate-	5
5-11, Tyngsbor-	Archie W. Swallow, .	Dunstable, .	W. H. Savill,	4
ough. 4-2, Duxbury, .	Henry A. Fish, South Duxbury.	Duxbury,	H. A. Fish,	7
146-5,	Richard H. Copeland, Box 115, Elmwood.	E. Bridgewater, .	Frank H. Taylor,	7
8-5,	Asher Markham,	E. Longmeadow,		-
24-3,	Adin L. Gill,	Eastham,	N. P. Clark, .	8
2-11,	J. M. Dineen,	Easthampton, .		-
76,	Frederick Hanlon, North Easton.	Easton,	R. W. Melendy, .	6
241-2,	Manuel S. Swartz,	Edgartown, .	John P. Fuller, .	8
165-25,	Frank W. Bradford, Great	Egremont, .		-
17-11,	Barrington. Herbert A. Coolbeth, .	Enfield,	H. C. Moore, .	5
No telephone, .	Chas. H. Holmes, Far-	Erving,	Chas. H. Holmes,	5
23-5,	Otis O. Story,	Essex,	O. O. Story,	2
		Everett,	P. O. Sefton,	1
1686-Y,	Chas. F. Benson,	Fairhaven,	G. W. King,	8
822-W,	Wm. Stevenson,	Fall River,	Wm. Stevenson, .	8
136-2,	H. H. Lawrence, Tea-	Falmouth,	W. B. Bosworth, .	8
745,	P. S. Bunker,	Fitchburg,	Page S. Bunker, .	4
Hoosac Tunnel	H. B. Brown, Drury, .	Florida,		-
pay station. 15-5 or 76-3,	Ernest A. White,	Foxborough, .	F. S. Richardson,	6
352-4, South Fram-	B. P. Winch,	Framingham, .	N. I. Bowditch, .	6
ingham. 66-12,	Edward S. Cook,	Franklin,	J. W. Stobbart, .	6
3-12,	Andrew Hathaway, As-	Freetown,	G. M. Nichols, .	8
191-M,	Geo. S. Hodgman,	Gardner,	T. W. Danforth, .	5
	Leander B. Smalley, Menemsha.	Gay Head,	J. W. Belain, .	8
31-4,	Clinton J. Eaton,	Georgetown, .	C. J. Eaton,	3
4-15, Bernardston,	Lewis C. Munn, Turners	Gill,	R. E. White,	5
547-5,	Falls. Sydney F. Haskell,	Gloucester, .	H. J. Worth,	2
18-4,	John S. Mollison, Wil-	Goshen,		-
No telephone, .	liamsburg. Rodney E. Bennett, .	Gosnold,		-
		1	1	

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	W. A. Getchell, North	Grafton,	Č. K. Despeau, .	5
3-13,	Grafton. C. N. Rust,	Granby,	Chas. N. Rust, .	5
3-3,	Harry A. Root,	Granville,		_
327-W,	Daniel W. Flynn,	Gt. Barrington,	T. J. Kearin, .	5
439-М,	J. W. Bragg,	Greenfield,	J. W. Bragg,	5
33-24, Enfield, .	Wm. H. Walker, Green- wich Village.	Greenwich, .	E. A. Sawtelle, .	5
71-5,	Chas. M. Raddin,	Groton,	J. F. Bateman, .	4
2939-X,	Sidney E. Johnson, .	Groveland,	R. B. Larive, .	3
651-33,	Edward P. West,	Hadley,	Edw. P. West, .	5
5-2, Bryantville,	W. L. Robertson,	Halifax,	F. D. Lyon,	7
128-W,	Fred Berry, Essex, R. F. D.	Hamilton,	E. G. Brewer, .	2
5-14,	Edward P. Lyons,	Hampden,		-
17-F-2,	Chas. F. Tucker,	Hancock,		-
51-5, Rockland, .	Chas. E. Damon, North	Hanover,	L. Russell,	7
12-23,Bryantville,	Hanover. Geo. T. Moore, South	Hanson,	Geo. T. Moore, .	7
2-5,	Hanson. Henry J. Breen,	Hardwick,	Geo. J. Fay,	5
46-3,	Benj. J. Priest,	Harvard,	G. C. Maynard, .	4
8000,	John Condon,	Harwich,	Arthur F. Cahoon,	8
34-2	Fred T. Bardwell, North	Hatfield,	Seth W. Kingsley,	5
4-2 or 4-1,	Hatfield. John B. Gordon,	Haverhill,	M. J. Fitzgerald, .	3
6-7, Charlemont,	Herbert A. Holden, .	Hawley,		-
5-18,	S. G. Benson,	Heath,		_
21305,	Geo. Cushing,	Hingham,	T. L. Murphy, .	7
20,	Louis B. Brague,	Hinsdale,		-
134-W, Randolph,	Melvin L. Coulter, .	Holbrook,	Bradford Parks, .	7
42-4,	Winfred H. Stearns, Jef-	Holden,	W. H. Stearns, .	5
5-21, Brimfield, .	ferson. Oliver L. Howlett, South-	Holland,	A. F. Blodgett, .	5
1-2,	bridge, R. F. D. W. A. Collins,	Holliston,	Herbert E. Jones,	6
2295-W,	C. J. Healey,	Holyoke,	T. A. Bray,	5
112-4,	Walter F. Durgin,	Hopedale,	W. F. Durgin,	5
Central,	R. I. Frail,	Hopkinton, .	W. A. MacMillan, .	5
6-13,	E. A. Young,	Hubbardston, .	E. A. Young,	5
132-М,	Wm. T. Greene,	Hudson,	F. P. Hosmer, .	4
248-W,	Smith F. Sturges, Aller-	Hull,	J. Knowles,	7
4-11,	John J. Kirby,	Huntington, .		-
148-W,	Pindar F. Bussell,	Ipswich,	J. A. Morey,	. 2
15-3,	Arthur B. Holmes,	Kingston,	R. F. Randall, .	8

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
261-W,	Nathan F. Washburn, .	Lakeville,	N. F. Washburn, .	7
218-J,	Arthur W. Blood,	Lancaster,	L. R. Griswold, .	4
1295-24,	King D. Keeler,	Lanesborough, .	Geo. H. Judivine,	5
362,	Dennis E. Carey,	Lawrence,	I. B. Kelly,	3
66-3,	Jas. W. Bossidy,	Lee,		-
37-5,	B. H. Fogwell,	Leicester,	J. H. Woodhead, .	5
135,	O. R. Hutchinson,	Lenox,	T. Francis Mackey,	5
546 or 28,	Fred A. Russell,	Leominster, .	D. E. Bassett, .	4
9-44, Cooleyville,	O. C. Marvel, North Lev-	Leverett,	H. W. Field, .	5
480,	erett. Robert Watt,	Lexington,	A. P. Howe,	1
289-11, Greenfield,	Jacob Sauter,	Leyden,	Wm. A. Campbell,	5
44-W,	J. J. Kelliher,	Lincoln,	J. J. Kelliher, .	4
17-4,	A. E. Hopkins,	Littleton,	A. E. Hopkins, .	4
6375-J,	O. C. Pomeroy,	Longmeadow, .		-
3400,	E. F. Saunders,	Lowell,	J. G. Gordon, .	1
1-12,	H. A. Munsing,	Ludlow,	Ashley N. Bucher,	5
20,	Jas. S. Gilchrest,	Lunenburg, .	James S. Gilchrest,	4
1174,	Geo. A. Cornet,	Lynn,	G. H. McPhetres, .	2
	Andrew Mansfield, Jr.,	Lynnfield,	L. H. Twiss, .	2
	Andrew Mansfield, Jr., South Lynnfield. Watson B. Gould,	Malden,	W. B. Gould, .	1
319-W,	Peter A. Sheahan,	Manchester, .	P. A. Sheehan, .	2
1-R or 1-W, .	Herbert E. King,	Mansfield,	Marvin J. Hills, .	6
226-W,	Wm. H. Stevens,	Marblehead, .	W. H. Stevens, .	2
117-2,	Geo. B. Nye,	Marion,	J. Allenach, .	8
416 or 151-M, .	E. C. Minehan,	Marlborough, .	M. E. Lyons, .	4
43-3,	Wm. G. Ford,	Marshfield,	P. R. Livermore, .	7
31-2,	Darius Coombs,	Mashpee,	W. F. Hammond, .	8
13-3,	Frank A. Tinkham, .	Mattapoisett, .	Webster Kinney, .	8
138-3,	Geo. H. Gutteridge, .	Maynard,	A. Coughlin, .	4
106-4,	Waldo E. Kingsbury, .	Medfield,	G. L. L. Allen, .	6
53 or 138,	Chas. E. Bacon,	Medford,	W. J. Gannon, .	1
34-3,	Phineas MacNutt, West	Medway,	F. Hager,	6
	Medway.	Melrose,	J. J. McCullough,	1
156-6, Milford, .	Frank M. Aldrich,	Mendon,	F. M. Aldrich, .	5
21-3,	Edgar P. Sargent,	Merrimac,	C. R. Ford,	3
229,	Herbert Nichols,	Methuen,	A. H. Wagland, .	3
232-W,	W. H. Connor,	Middleborough,	A. D. Nelson, .	7

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
8003-2,	Thos. H. Fleming, Ban-	Middlefield, .		-
62-2,	Oscar H. Sheldon,	Middleton,	B. T. McGlauflin,	2
65-3,	Elbert M. Crockett, .	Milford,	P. F. Fitzgerald, .	5
	Harry L. Snelling,	Millbury,	E. F. Roach, .	5
5-2,	Chas. LaCroix,	Millis,	E. W. Stafford, .	6
322,	Nathaniel T. Kidder, .	Milton,	N. T. Kidder, .	7
No telephone, .	S. R. Tower,	Monroe,		-
12-22,	O. E. Bradway,	Monson,	Robert S. Fay, .	5
713-22, Greenfield,	F. B. Gillette,	Montague,	Dennis F. Shea, .	5
164-4,	D. C. Tryon,	Monterey,		-
3-24, Russell, .	Andrew J. Hall,	Montgomery, .		-
17-21, Copoke, N. Y.	G. W. Patterson,	Mt. Washington,		-
N. I.		Nahant,	T. Roland,	2
16-5,	Peter M. Hussy,	Nantucket, .	C. C. Macy,	8
31,	Thos. J. Deignan,	Natick,	H. S. Hunnewell,	6
195-1,	Howard H. Upham, .	Needham,	E. E. Riley,	6
No telephone, .	Chas. L. Baker,	New Ashford, .		-
2280 or 353,	Edward F. Dahill,	New Bedford, .	C. F. Lawton, .	8
6-4, Gilbertville, .	Frank A. Morse, West	New Braintree, .	E. L. Havens, .	5
13-6, Sheffield, .	Brookfield. E.M. Stanton, Mill River,	N. Marlborough,		-
Pay station, .	Rawson King, Cooleyville,	New Salem, .	R. King,	5
173-5, Newbury-	Wm. P. Bailey,	Newbury,	Percy Oliver, .	3
380,	Chas. P. Kelley,	Newburyport, .	C. P. Kelley,	3
30, N. S.,	W. B. Randlett, Newton	Newton,	W. W. Colton, .	1
41-5,	Center. Jas. T. Buckley,	Norfolk,	James T. Buckley,	6
205-W or 265, .	H. J. Montgomery,	North Adams, .	Franklin B. Locke,	5
821-W,	Geo. A. Rea,	North Andover, .	Fred W. Phelan, .	3
317-2,	Chas. F. Gehrung,	N. Attleborough,	F. P. Toner,	6
5-13,	Colby H. Johnson,	N. Brookfield, .	S. D. Colburn, .	5
33-3,	Henry Upton,	North Reading, .	G. E. Eaton, .	1
165,	F. E. Chase,	Northampton, .	Christopher Clarke,	5
45-5,	T. P. Haskell,	Northborough, .	T. P. Haskell, .	5
71-5,	W. E. Burnap, Whitins-	Northbridge, .	A. F. Whitin, .	5
2-3,	ville. Fred W. Doane,	Northfield,	F. W. Doane,	5
29-11,	Geo. H. Storer,	Norton,	G. H. Storer, .	18
11-4,	John Whalen,	Norwell,	J. H. Sparrell, .	7
55-4,	Frank W. Talbot,	Norwood,	Ebin F. Gay, .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
119-4,	Frank W. Chase,	Oak Bluffs, .	P. P. Hurley, .	18
17-5,	Chas. H. Trowbridge, .	Oakham,	C. H. Trowbridge,	5
67-13,	Frank M. Jennison, .	Orange,	F. M. Jennison, .	5
33-2,	James Boland,	Orleans,	A. Smith,	8
15,	Durand A. Witter,	Otis,		-
9-5,	Olin D. Vickers,	Oxford,	C. G. Larned, .	5
53-12 or 53-3, .	James Summers,	Palmer,	C. H. Keith, .	5
	Fred L. Durgin,	Paxton,	F. L. Durgin, .	5
182-Y,	M. V. McCarthy,	Peabody,	J. J. Callahan, .	2
144-3,	Edw. E. Adriance,	Pelham,	Marion E. Ricnard-	5
7-23, Bryantville,	Jos. J. Shepherd,	Pembroke,	J. J. MacFarlan, .	7
54-3 or 12-5, .	Geo. G. Tarbell, East Pep-	Pepperell,	J. Tune,	4
	perell. Walter H. Pike,	Peru,		-
13-2,	Geo. P. Marsh,	Petersham,	Daniel Broderick,	5
176-6, Athol, .	Wm. Cowlbeck, Athol, R.	Phillipston, .	W. H. Cowlbeck, .	5
871-M,	F. D. Thos. F. Dumont,	Pittsfield,		-
33-22,	Albert F. Dyer,	Plainfield,		-
283-J, North At-	R. P. Rhodes,	Plainville,	Elmer Walden, .	6
tleborough. 451-M,	Ira C. Ward,	Plymouth,	A. A. Raymond, .	8
11-14, Kingston, .	Thos. W. Blanchard, .	Plympton,	D. Bricknell, .	8
19-4, Highland, .	A. W. Doubleday, Green-	Prescott,	C. M. Pierce, .	5
13-4,	wich Village. Fred W. Bryant,	Princeton,	F. A. Skinner, .	5
49-11,	J. H. Barnett,	Provincetown, .	J. M. Burch,	8
1,	F. T. Billings,	Quincy,	A. J. Stewart,	7
35-4, Randolph, .	R. F. Forrest,	Randolph,	Chas. Cole,	7
1284-R,	John V. Festing,	Raynham,	G. M. Leach, .	6
518-W,	H. E. McIntire,	Reading,	H. M. Donegan, .	1
11-12,	Benj. F. Monroe, Attle- borough, R. F. D.	Rehoboth,	S. W. Robinson, .	В
		Revere,	G. P. Babson,	2
8-2,	T. B. Salmon,	Richmond,		-
No telephone, .	Daniel E. Hartley, Mat- tapoisett, R. F. D.	Rochester,	Edw. F. Handy, .	8
55-X,	John H. Burke,	Rockland,	F. H. Shaw,	7
27-3,	A. J. McFarland,	Rockport,	F. A. Babcock, .	2
22-6, Charlemont,	Merritt A. Peck, Zoar, .	Rowe,		-
3-13,	Daniel O'Brien,	Rowley,	L. R. Bishop, .	3
279-2, Athol, .	L. G. Forbes,	Royalston,	A. H. Brown,	5
8009-11,	S. S. Shurtleff,	Russell,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
13-3,	Henry Converse,	Rutland,	H. E. Wheeler, .	5
		Salem,	Warren P. Hale, .	2
1-8, Amesbury, .	Jas. H. Pike,	Salisbury,	H. C. Rich, .	3
202-12, Winsted,	A. S. Strickland, New	Sandisfield, .		-
Conn. 43-2, Sagamore, .	J. R. Holway,	Sandwich,	B. F. Dennison, .	8
115,	Chas. L. Davies,	Saugus,	T. E. Berrett, .	2
4-16,	Clinton Tilton, Brier, .	Savcy,		-
129-3,	E. R. Seaverns, North	Scituate,	P. S. Brown, .	7
399-L-5, Paw- tucket.	Scituate. John L. Baker, Attle-borough, R. F. D. A. Alden Carpenter,	Seekonk,	C. W. Thompson,	6
121-2,	A. Alden Carpenter,	Sharon,	J. J. Geissler, .	6
26,	Arthur H. Tuttle,	Sheffield,		-
130-2,	Chas. S. Dole, Shelburne Falls.	Shelburne,	Chas. S. Dale, .	5
11-M,	Milo F. Campbell,	Sherborn,	J. P. Dowse,	6
16-21,	A. A. Adams,	Shirley,	A. A. Adams, .	4
48-2,	Edward A. Logan,	Shrewsbury, .	Robt. C. Clapp, .	5
	N. J. Hunting,	Shutesbury, .	E. Colfax Johnson,	5
2632-M., Fall River.	Wm. F. Griffiths, Swan- sea, R. F. D.	Somerset,	C. Riley,	6
	sea, n. r. D.	Somerville,	A. B. Pritchard, .	1
3164-W,	Louis H. Lamb, South Hadley Falls.	South Hadley, .	C. R. Frye,	5
151-23,	C. S. Olds,	Southampton, .	C. S. Olds,	5
13, Marlborough,	Harry Burnett,	Southborough, .	H. Burnett,	5
11,	Aimes Langevin,	Southbridge, .	A. Langevin, .	5
8-2,	Benj. M. Hastings,	Southwick, .		-
77-4,	A. F. Howlett,	Spencer,	G. Ramer,	5
20, Indian Or-	T. J. Clifford, Indian Orchard.	Springfield, .	J. Alden Davis, .	5
5-12,	Joel T. Wilder,	Sterling,	J. H. Kilburn, .	4
Post Office,	Geo. Schneyer, Glendale,	Stockbridge, .	Brown Caldwell, .	5
176-3,	Albert J. Smith,	Stoneham,	G. M. Jefts,	1
121-3 or 8120, .	James Curley,	Stoughton, .	W. P. Kennedy, .	7
134-J, Hudson, .	W. H. Parker, Gleason-dale.	Stow,	Henry W. Herrick,	4
6 21,	Chas. M. Clark, Fiskdale,	Sturbridge, .	C. M. Clark, .	5
5-5,	S. W. Hall, South Sud-	Sudbury,	W. E. Baldwin, .	4
46,	bury. A. C. Warner,	Sunderland, .	Richard Graves, .	5
58-32, Millbury, .	R. H. Richardson, .	Sutton,	Ransom H. Rich- ardson.	5
1911-Ј,	E. P. Mudge,	Swampscott, .	E. P. Mudge,	2
468-W,	Thos. L. Mason,	Swansea,	A. E. Arnold, .	6
320 or 1-W,	Fred A. Leonard,	Taunton,	L. W. Hodgkins, .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
30 or 26-5,	C. A. Fletcher, Baldwinsville.	Templeton, .	J. B. Wheeler, .	5
4249-J, Lowell, .	Harris M. Briggs,	Tewksbury, .	H. M. Briggs,	1
161-4 or 102-3, .	Elmer C. Chadwick, Vine-	Tisbury,	H. W. McLellan, .	8
No telephone, .	yard Haven. C. L. Vining,	Tolland,		-
Central,	Chas. W. Floyd,	Topsfield,	C. W. Floyd, .	2
11-2 or 37-2, .	F. J. Piper,	Townsend,	G. E. King,	4
No telephone, .	Walter F. Rich,	Truro,	J. H. Atwood, .	8
1,	Otis L. Wright,	Tyngsborough, .	C. J. Allgrove,	1
1-2, Lee,	H. E. Moore,	Tyringham, .		-
7-2,	E. M. Baker, Upton Cen-	Upton,	G. H. Evans, .	5
51-5,	ter. Lewis F. Rawson,	Uxbridge,	Willard Holbrook,	5
455-M or 59, .	Wm. E. Cade,	Wakefield,	W. W. Whittredge,	1
No telephone, .	Warren W. Eager,	Wales,	M. C. Royce,	5
107-2,	J. J. Hennessy,	Walpole,	P. R. Allen,	6
6,	Geo. L. Johnson,	Waltham,	W. M. Ryan, .	1
203-3,	Louis A. Charbonneau, .	Ware,	F. Zeissig,	5
45-23,	Delbert C. Keyes, South	Wareham,	J. J. Walsh,	8
46-6,	Wareham. Jos. D. Vigneaux, West	Warren,	A. A. Warriner, .	5
73-3, Orange, .	Warren. Chas. A. Williams,	Warwick,	Chas. E. Stone, .	5
12-4,	Lester Heath,	Washington, .		-
116, Newton North.	John C. Ford,	Watertown, .	J. C. Ford,	1
North.	William Stearns,	Wayland,	D. J. Graham, .	4
113-4,	Timothy Toomey,	Webster,	C. Klebart,	5
	John P. Doyle,	Wellesley,	F. M. Abbott, .	Б
No telephone, .	John Holbrook,	Wellfleet,	E. S. Jacobs,	8
74-32, Orange, .	Lewis B. Bowen, Wendell	Wendell,	G. E. Mills,	5
74, Hamilton, .	Depot. Jacob D. Barnes,	Wenham,	Jas. E. Kavanagh,	2
3-21,	Fred E. Clark,	West Boylston, .	R. K. Parker,	5
768, Brockton, .	W. P. Laughton,	W. Bridgewater,	O. Belmore,	7
37-13,	J. H. Webb,	W. Brookfield, .	J. H. Webb,	5
5-6,	Louis H. Flook,	W. Newbury, .	Frank D. Bailey, .	3
2067-W,	Dana S. Moore,	W. Springfield, .	Geo. W. Hayden, .	5
1-6,	Benj. P. Bissell,	W. Stockbridge,		-
203-23,	Wm. J. Rotch,	West Tisbury, .	H. W. Athearn, .	8
75-3,	Thos. H. Treadway, .	Westborough, .	Geo. Hayden, .	5
111-Y,	T. H. Mahoney,	Westfield,	-	-
44-11,	Harry L. Nesmith,	Westford,	H. L. Nesmith .	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
148-14, Easthamp-	C.A. Bartlett, Northamp-	Westhampton, .		_
1-3,	ton, Stage. Windsor F. Neal,	Westminster, .	G. A. Sargent, .	5
1392-М,	Benj. R. Parker,	Weston,	E. P. Ripley, .	4
14-21,	Frank Whalon,	Westport,	H. A. Sanford, .	18
123-M, Dedham,	Elmer E. Smith, Islington,	Westwood,	Martin Sorenson, .	6
154-W,	Edgar S. Wright,	Weymouth, .	C. L. Merritt, .	7
69-2, South Deer-	James A. Wood,	Whately,	Rylan C. Howes, .	5
field. 104-14,	C. A. Randall,	Whitman,	C. A. Randall, .	7
1-4,	Henry I. Edson,	Wilbraham, .	F. B. Metcalf,	5
4-11,	J. A. Breckinridge,	Williamsburg, .		-
34-14,	William Davies,	Williamstown, .	Wm. Davies,	5
34-4,	Howard M. Horton,	Wilmington, .	O. McGrane, .	1
29,	Arlon D. Bailey,	Winchendon, .	G. W. Drury,	5
123-2,	David H. DeCourcy, .	Winchester, .	S. S. Symmes, .	1
201-12, Windsor, .	Amos Ferry,	Windsor,		-
		Winthrop,	M. F. Smith, Jr., .	2
110,	Frank E. Tracy,	Woburn,	J. H. Kelley,	1
7112, Park,	Arthur V. Parker,	Worcester,	H. J. Neale,	5
10-22,	Chas. Kilbourn,	Worthington, .		-
23-5 or 8037, .	Geo. H. E. Mayshaw, .	Wrentham,	W. Gilmore,	6
53-33,	Jos. W. Hamblin,	Yarmouth,	C. R. Bassett, .	8

THE APPLICATION OF FORESTRY TO MOTH WORK.

The work of applying forestry practice to the control of the gypsy moths has proceeded steadily and with gratifying success during the past year. This work was started hardly two years ago, and has grown until it is now one of the most important features of the activities of the department. The theory of the work as outlined in the last annual report — the removal from our woodlands as much as possible of the favorite food trees of the moths, and the substituting and encouraging of species more resistant to the moth attacks — has been confirmed by the test of actual practice. In the methods of carrying on the forestry operations, and in the utilization of the resulting products, great advances have been made during the past year.

The combating of moths in shade trees, orchards and parks is a different problem from their control in wild woodland. In the first case the chief value of the trees is in their beauty or fruit-producing capacity. Such trees are much more valuable than trees which are allowed to grow chiefly for the wood they will produce when cut, as is the case with forest trees. Therefore, it is possible to use much more expensive methods in controlling moth infestations on the valuable shade trees than in the relatively valueless forest trees. That is the reason why the forestry methods of control, which call for the cutting of individual trees rather than the saving of them, were established. Undoubtedly it would be possible to save most of our forest trees by using shade-tree methods, - by spraying, etc., - but the trees thus saved would not be worth the cost, and there is not enough money to do it. It would cost millions of dollars a year.

In Europe, where these moths have existed from time immemorial, less than 5 per cent. of the forest growth is of oak. In eastern Massachusetts fully 50 per cent. is of oak. We must get approximately the European proportion in this country before we can expect the natural agencies of parasites, disease and birds to control the moths as they do in Europe. If left alone the moths will do this by themselves and kill off most of the oak, leaving the resistant species to grow up in its stead. By cutting the oak we can hasten the process and prevent the tremendous economic waste that would follow the killing of the oak. We can also prevent the desolation and fire risk which would accompany the killing. We know this is true, for we already have several thousands of acres of dead oak in the State. Proper cuttings made before the infestation becomes too serious will materially check moth spread. Taken after serious eating the cutting will merely lessen the resulting loss and hasten the return of the land to forest conditions.

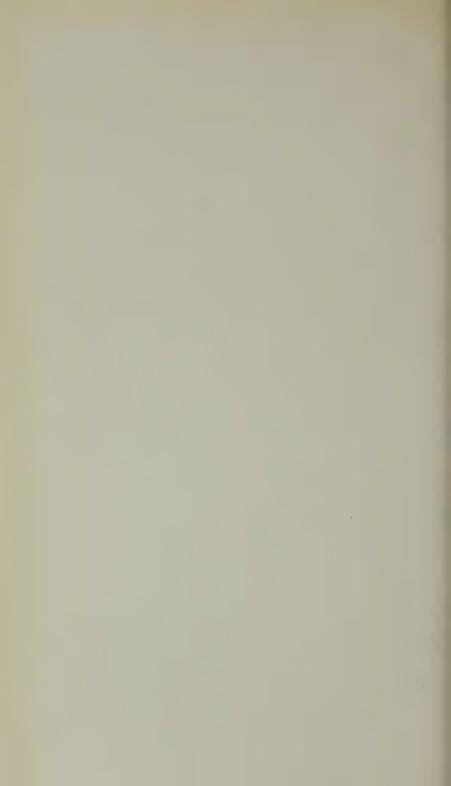
These moth thinnings are being carried on directly by the owners either in co-operation with the State or by themselves, rather than through the agency of the town authorities, as is the case of most of the other moth work. However, in many towns the local men are giving splendid aid in this work. Most of the towns have a sufficient financial burden in taking care



Stevens estate, North Andover. Putting sawdust on corduroy road used in logging.



Portable mill in operation on Stevens estate, North Andover. Process of rebuilding a hardwood forest injured by moths to one of white pine, which is moth resistant.



of their shade trees and roadsides. They have not the time nor the money to continually take care of the wild woodland. For owners who are willing to furnish the capital, the policy of this department has been to take complete management of the work, cutting the trees necessary to the best possible advantage, and selling the product afterwards. For other owners we have found buyers for the wood which we wanted cut, or have given advice and marked trees, etc., and left them to manage the cutting themselves. Many others have followed the example of the owners whom we have helped, and have done the thinning of their own accord.

The attempt in this work has been to put it on a firm business basis. The areas of large growth that have been cut have been lumbered according to the most modern methods, as would be done by any large lumber company. The smaller growth has been cut by the cord at the market price. Except where beauty or moth spread were factors, the owners have not been urged to carry on this work unless they could see before they started that it would at least pay for itself. The subject of utilization has been gone into most thoroughly. All the large wood dealers and brick vards have been called on, with the aim of persuading them to buy the wood which we have and will cut. New methods of utilization, such as chemical wood, charcoal, etc., have been studied. All the industries and dealers who use and buy oak lumber or logs have been written to, and many of them visited, in an attempt to find out what they want, so that the owners who cut may sell their product to them to the best advantage. In short, this office has been made a sort of clearing house for oak products, where the buyer and seller may meet.

As in the year previous, an attempt was made to get a complete list of all owners of infested woodland in the State. Many of these owners have since been written to and visited in an attempt to persuade them to practice forestry methods on their lands. Maps have been kept showing the infested areas, and also all lands examined. A card index of all owners to whom advice is given is also kept describing their peculiar conditions, and the attempt will be made to follow them up in future years; also an index of all oak buyers is maintained.

The educational and technical sides of the work have not been forgotten. A bulletin on thinning was published during the year and is being widely distributed. It tells how to do the work and contains many practical data. Any who have not received a copy and who are interested are invited to apply for one, which will be mailed without charge. Accurate cost data of all operations carried on under our management are being kept. We are now collecting data for an oak log rule, and also volume and yield tables, which we hope will be quite a contribution to technical forestry. Several towns in the moth-infested section were mapped this past summer in an endeavor to find out the exact forest and moth conditions. These maps will prove very valuable in carrying on the practical work.

This winter there are four trained foresters giving their whole time to this work, — two in the Boston office, one resident in the southeastern section, and one working on the technical data. On December 1, we had under our management five crews working on these thinnings in different sections of the State, including two portable saw mills. Before the winter is over we expect to have double that number of crews and mills at work. Besides that, there are a good many more engaged in thinning under our advice or stimulus, although not directly managed by this office. Several thousand acres will be thinned over this winter, and at least 20,000 cords of wood cut, also 2,000,000 or 3,000,000 feet of lumber and ties, making a total expenditure of private funds of probably \$75,000.

It is hard to make a report at this time because the operations are in full swing, and the work reported on is incomplete and so accurate figures cannot be given. Following is an attempt to tabulate just what has been accomplished from Dec. 1, 1913, to Dec. 1, 1914:—

Examinations. — The lands of 204 owners were examined by experts from this department, advice given, and in many cases detailed reports written. The total area included in these examinations was approximately 17,000 acres, situated in 81 towns or cities of the State.

Operations. — The following is a list of the thinning and cutting operations carried on during the past year, either under the direct management of this department or under its immediate supervision. Some of these operations were started before the year covered by this report and finished within the year, while others are now started but will not be completed until 1915. There are a total of 25 operations covering an area of 1,103 acres.

Owner.	Town.	Area (Acres).	
Miss Edith Andrew,	 Hingham,	4	
Charles B. Barnes,	 Hingham,	30	
George H. Barton,	 Stow,	12	
Mrs. Alexander Churchward, .	 Boxford,	30	
Erskine Clement,	 Haverhill,	9	
Mrs. Abby G. Davis,	 North Andover,	6	
Miss C. A. French,	 North Andover,	35	
Walter P. Frye,	 Hudson,	12	
A. H. Hodgdon,	 Westwood,	12	
Karlstein Estate,	 Dedham,	82	
Mrs. Alfred Rodman,	 Dedham,	80	
New Bedford Water Works, .	 Middleborough and Rochester, .	300	
Howard Marston,	 Barnstable,	35	
Province Lands,	 Provincetown,	80	
F. P. Royce,	 Dedham,	2	
W. E. Schrafft,	 Weston,	60	
J. Duke Smith,	 Medfield,	10	
Nathaniel Stevens,	 North Andover,	110	
Nathaniel Stevens,	 Boxford,	15	
United States Naval Magazine,	 Hingham,	60	
Mrs. S. C. Wheelwright,	 Cohasset,	10	
W. A. Whiteomb,	 Dedham,	32	
Mrs. D. P. Wight,	 Dedham,	2	
Arthur Winslow,	 Middleborough,	35	
W. P. Wharton,	 Groton,	40	

Besides these operations many have been carried on under the supervision of the district moth superintendents, and many more under the advice of this department without further assistance.

Of the operations listed, 428 acres were actually cut over during the fiscal year of 1914. On them 4,718 cords of wood

were cut, 286 piles, 148 posts and 385 thousand feet of lumber, including railroad ties which would number about 4,000. On this work the owners have spent \$17,327.42, and the State has contributed merely the salary and traveling expenses of the forester managing and supervising.

Utilization. — One of the important parts of the work has been the disposal and sale of the wood cut in these thinnings. Besides selling the wood cut under our direct supervision we have attempted to aid owners who have cut on their own responsibility. This past year we have negotiated sales to the amount of nearly \$5,000. We have contracts for products worth about \$20,000, which will be filled as soon as delivery can be made. The owners themselves have sold about \$4,000 worth of wood which was cut under our direction. There remains to be sold about \$10,000 worth of wood which is already cut. Much of this will be sold as soon as it becomes dry enough to be merchantable.

These results are only a beginning in what must be accomplished in the woodlands of the State. The encouraging features are, first, that most of these operations have been on a paying basis. Only a few of them have resulted in any net expense to the owner. Most of them have shown a profit. From the \$17,300 spent last year the returns should be over \$23,000, a profit of \$5,000. This work has proven that the moths can be attacked in the woodland without the expenditure of large sums of money, as is necessary in the other methods of moth control. The one great need is of capital to finance these operations. The poor man who owns woodland may not be able to do this work, which will yield a profit in the end, because he cannot pay for the wood chopping. However, we hope to overcome this difficulty in a large measure in the future by finding purchasers for the wood before it is cut. Second, this work is on a practical and common-sense basis, and cannot help appealing to the ordinary citizen. work will result in better and more valuable forests for the Commonwealth in the future. The pine, which is the natural and more valuable species for the land, is being made to supplant the oak, which is not best suited for most of the land on which it grows, and which is worth only a tenth as much.

Furthermore, these operations stand as practical and easily accessible object lessons in the practice of forestry, and are awakening great interest in the subject among many of our citizens. Mr. Kneeland and the young men assisting him in this work are accomplishing a great amount of constructive moth and forestry work that is bound to prove of great future economic value.

FOREST MAPPING.

This last season the field work of the forest survey of Worcester County towns has been completed save for a portion of Hubbardston, which will have been finished shortly after this report goes to the printer.

A very thorough forest map of Winchendon, showing the character of growth on every portion of the town, was made in co-operation with the United States Bureau of Entomology. Mr. Ingall, of the United States Bureau of Entomology, and Mr. C. H. Guise, surveyor for this office, did the field work of forest mapping, being accompanied by Mr. Wilcox and Mr. Schaffner, respectively, experts from the United States Entomological Laboratory, who collected data for classifying and mapping areas according to their susceptibility to gypsy moth infestation. The field work was done by running the paced compass lines from one town line to the other every quarter mile, instead of every half mile as has been done in other towns. This quarter-mile strip in the field enabled Mr. Ingall to complete a very satisfactory detail working map showing in different colors the different combination of species. It is hoped the town will use this in eradicating the gypsy moth food, which would prove at the same time a long step towards converting the large woodland area of the town into a coniferous forest, practically immune from the gypsy moth. It is to be hoped that the town of Winchendon will co-operate with the Federal and State governments in this, since it would not only prove a valuable experiment on a large scale with gypsy moth conditions, but would make the woodland areas of Winchendon vastly more valuable than at present by converting large areas of practically worthless growth into pine. For Winchendon we have figures showing in detail the area in practically every combination of species for different sizes of growth.

Owing to serious insect conditions in Plymouth County it was thought best to begin mapping and estimating there before completing Worcester County. Five towns of Plymouth County were covered, approximately one-third the area of the county. The towns are Brockton, Hingham, Hanover, Middleborough and Carver.

For the Plymouth County work we have used, instead of pantographic enlargements, photographic enlargements of the United States Geological Survey maps, the scale being approximately 1 inch to 2,000 feet. This should prove a very satisfactory standard map for all the woods work of the different branches of the department. The cost of the maps is several dollars a town less than the old process, and the maps are far more satisfactory. Adopting this process and standard scale for all field maps should save the State many thousands of dollars. We acknowledge our indebtedness to Forester W. O. Filley of Connecticut for a valuable suggestion in connection with this process.

While figures of acreage estimates, and the estimate maps, are available for practically all the towns covered individually, they have not yet been tabulated for comparison. This should be completed in a few weeks, and shortly thereafter we hope to have the estimate maps colored, and to have them on file at the office easily accessible so that any one can get an idea visually of the character of growth in any section. It might be said here that our figures show forested areas of the towns averaging about 60 per cent., with forested areas of some towns as high as 80 per cent.

Another season we may try mapping forest areas from automobile, with the half-mile strip method used only on every fifth town. While much less satisfactory, especially unless done by a very capable man, the automobile mapping would be very much quicker and cheaper. By having every fifth town worked by the strip system, fairly accurate detail figures could be obtained for each county as a whole.

This mapping work has been done under the supervision of Mr. Harold Fay, who has also assisted in other important general forestry work as occasion demanded.

FOREST MANAGEMENT.

The increasing interest being shown each year by woodland owners in connection with the management of their holdings according to now well-established forestry principles is very encouraging. Requests have come in continually during the past season from owners desiring an examination of their forest property, and advice as to its proper management. These requests have been attended to in the order in which they have been received, and in every case a trained forester has made an examination and given either verbal or written advice in regard to the management of the property. A list of these examinations for the season just ended is as follows:—

. Name.	Location.	Area (Acres).
Appalachian Mountain Club,	Warwick,	42
R. H. Howe,	Worcester,	4
E. M. Chase,	Holyoke,	10
David Carrick,	South Royalston,	10
W. B. Cross,	Halifax,	140
W. B. Cross,	Brockton,	15
E. H. Pratt,	North Adams,	85
C. O. Prescott,	Westford,	500
A. R. Sharp,	Taunton,	75
State Board of Agriculture,	South Walpole,	400
E. L. Gillett,	Westfield,	300
Indian Spring Camp,	Plainfield,	250
Greenfield Women's Club,	Greenfield,	20
Mansfield Water Board,	Mansfield,	200
Metropolitan Water Board,	Northborough,	160
Nevins Library,	Methuen,	1
Mount Hermon School,	Gill,	50
Northampton Water Board,	Northampton,	30
Miss M. Deane,	East Taunton,	В
Northfield Seminary,	Northfield,	150
Hopedale Park Board,	Hopedale,	75
Irving Smith,	Ashburnham,	3,500
Tax Commission,	Williamstown,	1,000
Miss F. True,	Salisbury,	50

NAME.	Location.	Area (Acres)
C. L. Wilder,	Lancaster,	190
L. E. Bassett,	Southville,	210
Geo. Blake,	Lenox,	250
Walpole Park Board,	Walpole,	300
Mrs. A. W. P. Crocker,	Foxborough,	80
Dr. V. C. Pond,	Foxborough,	105
G. M. Deane,	Coldbrook,	75
A. Sedgewick,	West Stockbridge,	300
J. M. Heald,	Lincoln,	20
H. W. Smith,	North Grafton,	150
W. A. Gaston,	Barre,	100
Mr. Tucker,	Acton,	30
Dr. Cady Phipps,	Sherborn,	25
Boylston Manufacturing Company,	Jefferson,	42
D. W. Gaskill,	Blackstone,	143
Miss C. Hosmer,	Orange,	200
Foxborough Water Board,	Foxborough,	75
Miss Harriet Ames,	 Shutesbury,	125
E. C. Wood,	Northfield,	50
State Colony,	Gardner,	1,600
State Colony,	North Grafton,	900
Worcester Country Club,	Worcester,	40
Alice H. Marsh,	Sturbridge,	10
B. Curtis,	Medfield,	40
F. O. Houghton,	Millis,	100
Mrs. M. B. Cutting,	Sudbury,	80
Miss Sarah Pratt,	Sudbury,	200
George Timmons,	Ware,	350
C. K. Ellis,	 Carlisle,	20
John White,	Freetown,	65
Wellesley College,	Wellesley,	60
State Fish and Game Farm,	Palmer,	200
Blanche M. Brine,	Manomet,	40
Geo. A. Brooks,	Manomet.	10

Total number of examinations, 58; area covered, 13,255 acres; expense to owners, \$124.45.

Thinnings.

The department's work in connection with woodland thinnings has shown an increase this year over last. In some cases, and where so desired by the owner, this department has taken charge of the thinning operations from beginning to end, while in other cases the trees to be removed have been marked and the owners have supervised the remaining work themselves. Some of the places that have received attention this year are as follows:—

Wellesley College. — A heavy marking in the trees on about 60 acres was made during the fall. The marked trees are to be removed by the grounds superintendent and his men this winter. Stumps are to be cut low, brush burned, and the area will be in suitable condition in the spring to stock with conifers if the authorities desire to do so. The trees to be removed are mostly white oaks.

St. Augustine Farm. — Work was started last winter and is being continued at the present time on the 125-acre property known as the St. Augustine Farm, located in Foxborough, Mass. The operation consists of heavy, medium and light thinnings, clean cutting in places to be followed by planting. A fire line 75 feet wide and 2,000 feet long has been made during the past two months. The woodland consists of large, medium and small white pine and mixed hardwoods. One small stand of planted pine about twenty years old is making excellent growth.

Alfred Mellor Property. — This operation is continued from last season, and is at present under way on the 200-acre tract of Alfred Mellor, located in Cummington, Mass. It consists of a thinning in conifer and mixed hardwood growth, and is of especial interest on account of the very large size of many of the trees involved. There are several hemlocks on the tract that will run over 1,000 board feet per tree, and very large maples are numerous. Trees of such size are unusual in Massachusetts at the present time, and give one an idea of what the original forest of the State was like.

Mrs. W. A. P. Crocker. — This 80-acre tract, located in Foxborough, Mass., consists of one of the best pine stands remain-

ing in the section. About 50 acres is stocked with pure white pine of all ages up to ninety to one hundred years of age. A camp has been erected and a crew has been in the woods for the past three months removing marked trees. Several thousand feet of lumber have been cut from this tract up to date, and it is believed that, aside from putting the area in much better condition, the operation will show a profit to the owner. All wood products are to be used at the owner's mill. On this tract, also, is a planted stand of white pine twenty-two years old that is making good growth. Planted pine thirty-five to forty years old is also to be seen.

Boylston Manufacturing Company.—A thinning and cleancutting operation is at present in progress on the 45-acre tract in Jefferson, Mass., owned by the Boylston Manufacturing Company of Easthampton. The thinning and clean cutting is to be followed by planting to pine in the spring. This operation is of interest as an indication that large business concerns owning forest land are beginning to realize that it is not good business policy to allow their holdings to remain idle and neglected.

Fire Line.

On the W. B. Cross property in Brockton, Mass., a fire line nearly 1 mile long and 60 feet wide has been made during the past two months. This fire line follows the highway for the entire distance, and in conjunction with the road itself makes an excellent line of protection against fire for the property of Mr. Cross. All brush was clean cut and burned.

Other places where the trees have been marked and work is to be done this winter are as follows:—

I	VAME			Locat	Area (Acres).		
W. A. Gaston Esta	te,			Barre,			20
Worcester Country	Clul	ο,		Worcester, .			40
H. W. Smith, .				North Grafton,			100
State Hospital,				Taunton, .			50
State Hospital,				North Grafton,			400
State Hospital,				Gardner,			1,000
Geo. Timmons,				Ware,			350
E. F. McSweeny,				Lake Boone, .			5

This department is pleased to note that some of the State institutions are inaugurating a forest policy for their woodland property. This year something along forestry lines is being done on the woodland of the Taunton, North Grafton and Gardner State hospitals for the insane. It has been proven that the able-bodied men inmates of the insane institutions can do very well the needed work in the woodland areas owned by the various institutions, and thereby benefit not only the woodland and institutions, but themselves as well, for the forest work makes a very healthful occupation. At the Gardner colonies alone there are 75 or 80 inmates who will be employed this winter in improving the woodland areas of that institution. There are 600 or 700 acres of blank, or what is termed as absolute, forest land that can and should be planted with conifers during the next few years. This work can all be done by the inmates. It is planned to establish a nursery in the spring at the Gardner Colony that will stock 100,000 transplants a year for the next six years: The seedlings will be furnished by the department's nursery at Amherst.

The department is pleased to assist the various State institutions in any way in connection with the better management of their forest property. The combined areas of the various State institutions amount to thousands of acres, and it is certain that were a definite forest policy followed up on these areas much good would result.

Walpole Town Forest.

It is quite probable that during the coming year a definite start will be made towards establishing a permanent town forest in Walpole, Mass. The proposition has been considered by Mr. Charles Sumner Bird, Jr., chairman of the park board, and other citizens of the town during the past few months. A survey of 200 acres has been made, 100 acres more examined, and data collected in connection with the town forest plan, and it is hoped an appreciable start will soon be made in the matter. That a town forest is an excellent and valuable asset to a town cannot be disputed. There are many towns throughout the Commonwealth that have right at their very doors, so to speak, the property suitable for the making of excellent town forests, and it is hoped that during the next few years many towns will make a start along this line.

Surveys.

The following is a list of the lots taken over for reforestation: —

Nam	s.		Loc	Area (Acres).			
Eleanor Johnson, .			North Adams, .				100
Marcus M. Brown, .			Marlborough, .	٠			90
Harmon & Thayer, .			Savoy,				35
W. G. Perry,			Medfield,				26
W. G. Perry,			Medfield,				12
W. G. Perry,							3

Surveys were also made of the St. Augustine Farm in Foxborough and of the Crocker lot in Foxborough.

Working Plans.

A working plan was made this year for the property of Irving Smith. This property consists of 3,350 acres in Ashburnham and 50 acres in Winchendon. The complete plan consists of (1) an examination, with estimates and recommendations in the form of a typewritten report; (2) a forest map covering the entire tract, based upon a lot survey by a professional surveyor and a timber survey by this office; and (3) a large scale detail map showing the areas recommended for treatment during the next ten years. The growth was divided into types, each of which was estimated separately. The general recommendations were made covering cutting, thinning and planting.

Specific recommendations were also made, to be followed closely for the first ten years, but subject to revision in the future to meet varying conditions.

If possible, working plans will be made during the summer of 1915 for the 1,600-acre tract of the State Colony at Gardner and the 900-acre tract of the State Colony at North Grafton. A certain amount of data has been procured in connection with a plan for the Fish and Game Farm of 200 acres in Palmer.





Extracting seed from pine cones, Fall River water commission, on Wautuppa Reservation.



Fifty-six year old plantation of white pine, Sharon, Mass. Will yield about 40,000 board feet to the acre. Our waste lands can be made to yield thus if replanted to pine.

Maps.

All unfinished maps were completed during the year. At the present time a large line map is being made for the use of observation stations in connection with forest fire work. Pocket field maps are also being made for use during the coming season.

NURSERY WORK.

Our principal advance in nursery work this past season was the leasing of 7 acres of remarkably fertile soil in the village of Barnstable. In the early spring a portion of the ground was cleared and plowed, and 300 12 by 4 feet seed-beds were placed in position. These beds are of the latest type wooden frames, with wire sides and a combined wire and lath cover screen. In addition, some 200,000 pine, spruce and ash were set in as transplants. The seed-beds have shown remarkable germination, and will produce an immense crop of two-year seedlings one year hence. Water is supplied by a gasoline engine pumping from a well to an elevated tank. A small but neat building to serve as a camp for the men and a storehouse for tools was also erected. Only one-half of the 7 acres is at present in use, but by next spring the entire area will be ready for transplanting.

The nursery at Sandwich, which, owing to the sandy soil and the difficulty of getting water, was unsuccessful, has been discontinued.

We also did no further transplanting at Hopkinton, where we have in the past set in some surplus stock that could not be accommodated at Amherst.

The nursery which we operate in co-operation with the State Farm at Bridgewater this spring suffered severely from frost heaving. We lay this to two causes, — fall transplanting and the rawness of the soil, which had just been newly cleared and never cultivated. We shipped 100,000 seedlings to take the place of those heaved out, and do not anticipate that the same trouble will occur again. If it does, another site can be selected for future work.

The Amherst nursery has been our main source of supply during this year, as it has been in the past. One hundred and

fifty of the latest type seed-beds have been installed, and water conditions improved by the laying of a larger main from the college grounds to the connection with our nursery. A telephone also aids materially in the transaction of business.

Three classes of stock are shipped from our nursery. The first is for use on the lots which we have taken over under the reforestation law, and is largely transplanted material. The second class goes to other State institutions, which under the nursery law we furnish with forest planting stock, and is partly transplanted and partly seedling material, according to whether it is intended for use in the field or for the transplanting in their own nurseries. The third class is seedling material which we send to our nurseries for transplanting.

STOCK FOR PLANTING ON REFORESTATION LANDS.

White pine (four-year transplants), .				390,000
White pine (three-year transplants),				210,000
Norway spruce (three-year transplants),				16,000
				5,000
European larch (two-year seedlings),				6.000

STOCK SHIPPED TO OTHER STATE DEPARTMENTS.

Metropolitan Park Commission (two-year seedlings), .		200,000
Metropolitan Water Board (two-year seedlings),		300,000
Fisheries and Game Commission (two-year seedlings), .		50,000
Fisheries and Game Commission (three-year transplants),		3,000

REFORESTATION WORK.

The lands taken over under the terms of the reforestation law can be divided into two classes. The first is land purchased outright by the State, which it is probable it will hold as a permanent investment, and the second is land which private owners have deeded to the State without cost, for the purpose of having the State Forester plant and care for it for a period not to exceed ten years, when they will redeem the land by paying the cost of reforesting and maintenance. The first we call purchased lands, and the second deeded lands.

Reforestation work usually partakes of two operations,—planting and brush cutting. On old pasture land, and often on cut-over pine land where sprout or bush growth does not come

in very rapidly, planting is the only work necessary, but in eut-over hardwood land, or on very brushy pastures, it is necessary to clear the brush in whole or in part either before or after planting. As a usual thing such brush clearing is not done until a year or two after the planting, because the shade of the sprouts is a useful factor of protection for the newly planted pines. However, where sprout growth is exceedingly dense it must be cleared before planting can be attempted.

It is evident from the above that in addition to the new work carried out each year there must be more or less done along the lines of maintaining and improving the growing plantations. Not only must the growing pines be freed from encumbering hardwood sprouts, but blanks in the stand due to drought or other causes must be filled in and losses by fire made good. Fences must be repaired and kept up. We are glad to say, however, that fire losses have been comparatively few. During the past year we have lost through fire one lot of 20 acres in Dennis and one of 15 acres in Oakham.

New Work, 1914.

Purchased Lands.

	(Own	ER.		Town.	Area (Acres).	Number of Trees planted.	Brushed (Acres).	
Fenno,					Westminster,	100	85,000	100	
Fiske,					Buckland,	75	70,000	25	
Rice,					Spencer,	40	50,000	-	

Deeded Lands.

Irving Smith,	 		Ashburnham,	 		150	70,000	
Eben Smith, .		·	Barnstable,			17	20,000	17
Webster, .			Warwick, .			50	51,000	_
Lewis,			Groton, .		٠,	18	14,000	-
Johnson, .			North Adams,			100	50,000	5
Baker,			Phillipton,			10	11,000	-
Perry,			Medfield, .		1.	35	15,000	-

MAINTENANCE WORK.

Lot Number.		1	'own.			Area (Acres).	Nature of Work.
75	Oakham, .					18,0001	Filling in blanks.
91	Spencer, .					20,0001	Filling in blanks.
11, 12	Spencer, .					60	Brushing.
22	Hubbardston,					10	Brushing.
26	Templeton,					60	Brushing.
6	Templeton,					30	Brushing.
37	Templeton,					.50	Brushing.
53	Hubbardston,					25,0001	Replanting.
3	Hubbardston,					15,0001	Filling in.
16	Westminster,					30 2	Brushing and filling in.
38	Ashburnham,					20	Brushing.
8	Ashburnham,					4	Brushing.
80	Rutland, .					6,0001	Filling in.
74	Dover, .				.	14	Brushing.
7	Andover, .					20	Brushing.
25	Rowley, .					8	Brushing.
114	Manchester,					5	Filling in.
50, 51	Hopkinton,					303	Brushing and filling in.

¹ Number of trees used in filling in. The area covered would vary greatly on different lots.

To summarize the above tables: along the line of new work, planting equals 500 acres and brushing, 150 acres; in the line of maintenance, planting is equivalent to 115 acres and brushing to 340 acres.

When we say the planting is equivalent to 115 acres we mean that the number of trees used in filling in, if planted 6 by 6 feet apart, would cover that area. The actual area covered is much greater.

THE STATE FIRE WARDEN'S REPORT.

Mr. F. W. RANE, State Forester.

Sir: — In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year: —

^{2 10,000} trees used in filling in.

³ 20,000 trees used in filling in.

While we have experienced a very serious drouth during the summer and fall of 1914, and our number of fires exceeds by a large margin that of any former year in the history of the department, we have been able, by the efficient work of our men and the hearty co-operation of many residents of the Commonwealth, to hold our loss to a remarkably low figure. With a period of thirty-eight days, from September 9 to October 17, with only one-fourth of an inch of rainfall, and during this period a legal holiday. October 12, which was also the opening day of the hunting season, with 60,000 hunters and as many more pleasure seekers roaming through the woods from Cape Cod to the Berkshire Hills, it is not surprising that many dangerous fires occurred. On this date our reports show 166 fires reported, mostly confined to Middlesex, Worcester and the western counties. Of the above fires, 13 were dangerous, and burned over an area of nearly 8.000 acres. While the area burned was not all forested land, considerable timber was destroyed. Most of these fires would have been controlled at the start providing our observation system had been completed in this locality, but it is necessary that 7 more stations be established throughout the central and western part of the State in order to fully protect this area. On October 12 there were 166 fires, and for the week ending October 17, 384 fires were reported. Owing to the large number of fires at this time, His Excellency the Governor was obliged to declare a close season on game extending to October 17.

We have maintained the same arrangement of districts as in former years, viz., four districts, each under the supervision of a district forest warden; but owing to our construction work throughout the eastern part of the State being done entirely by the district men, they have been unable to devote as much time to organization work in their several towns as had been hoped. This difficulty will be overcome as our system becomes completed, and we are in hopes that another year will practically finish the construction work.

The amendment of the forest law relative to the appointment of town forest wardens, allowing such appointments to be made in January instead of in March and April, has facilitated the work of this department, as we are enabled to have our lists completed during February and in readiness for spring fires. I am still of the belief that much better results would be accomplished throughout the State if this department were to appoint these town forest wardens. We are handicapped in a number of towns by having inefficient wardens who do not have the faculty of handling men and who are not interested in the protection of the forests. I firmly believe that our district men can recommend to this department in the different towns throughout their districts men who have the interests of the Commonwealth at heart and who would make ideal forest wardens, — men who would co-operate with our observers, perfect a forest fire-fighting organization in their towns, and not only be the means of lessening the expense of extinguishing fires, but also materially reduce the damage.

Observation Stations.

We have had in operation this year 24 observation stations reporting 3,013 fires, as follows:—

Becket Mountain, Becket,						63
Blue Hill, Milton, .						236
Bluff Head, Sharon,						203
Bonney Hill, Hanson, .						68
Bournedale, Bourne, .						54
Copecut Hill, Fall River,						33
Cran Pond Hill, Ashfield,						2
Fay Mountain, Westborough	١,					386
Grace Mountain, Warwick,						94
Hart Hill, Wakefield, .						174
Harwich, Harwich, .						35
Howland's Hill, Falmouth,						1
Lincoln Mountain, Pelham,				•		47
Massaemet Mountain, Shelb						130
Middleborough, Middleborou						133
Mt. Tom, Easthampton,						135
Morse Hill, Essex, .						96
Reservoir Hill, Plymouth,						116
Richmond Hill, Dighton,						105
Robbins Hill, Chelmsford,						302
Shoot Flying Hill, Barnstabl	e,					14
Steerage Rock, Brimfield,						90
Tower Mountain, Savoy,						11
Wachusett Mountain, Prince	eton,					485
Total,						3,013

Of the above stations five were new this year, four of which were placed in operation late in the season. Two substations, one on Prospect Hill in Petersham, and one on Little Mugget Hill in Charlton, it was not deemed advisable to use this season.

A new steel tower 40 feet high, with a 10 by 10 foot room at the top, has been erected on Shoot Flying Hill, Barnstable, to replace the old wooden structure that had been in use for nineteen years. The new tower is 10 feet higher than the former one, and gives an excellent view for a radius of 12 miles.

During the season an observation room for the Bournedale tower has been completed. A new 40-foot tower has been erected on Howland's Hill, Falmouth, which enables us to protect several other towns.

A new 60-foot steel tower has been erected on Copecut Hill in Fall River. This is located near the Watuppa Reservation and protects a large forested area in Fall River and adjoining towns. The city of Fall River, as well as the towns of Westport and Dartmouth, contributed very liberally toward the expense of erecting this tower.

An observation station has been established on Prospect Hill, Petersham, but no tower was erected. One mile of telephone line was con-

structed. This station protects the Harvard School holdings of several thousand acres.

A wooden tower, with 1 mile of telephone line, has been installed on Cran Pond Hill in Ashfield. This is one of several stations that are needed in western Massachusetts to protect the large forest areas in that portion of the State.

The observation towers have again demonstrated their value in the large number of fires reported and extinguished in their incipiency. The following comparative statement of forest fires during the year 1911 with those of 1914 is very interesting, the 1911 loss being before the present fire lookout system was established.

Comparative Table of Fires, 1911 and 1914.

			Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1911,			2,536	99,693	\$47,093	\$537,749	39.31	\$226 24
1914,			3,181	38,975	48,750	95,389	12.25	29 98

These figures are very significant. The period of drouth was more serious and considerably longer in 1914 than in 1911, thereby making the fire danger much greater. In studying this table you will note that we had 645 more fires in 1914 than in 1911, but that our damage was reduced nearly \$450,000 in 1914. Again, the average damage per fire in 1911 was \$226.24 as against \$29.98 this year.

While we have had some large fires, they are not chargeable to the inefficiency of our observers or to their neglect of duty. I have in mind an instance where the observer called up the town forest warden, giving him the exact location of a fire which was just starting. The warden, being doubtful, telephoned two or three parties near the location of the fire and received the reply that they were unable to discover any fire. Two hours later he received a telephone call stating that the fire had then covered 50 acres. The outcome was that 500 acres were burned over.

We have had an unusually large number of visitors to the towers this year, and I believe that when pleasure-seeking automobilists become familiar with our roads leading to within a few minutes' walk, and in many cases directly to the towers, this number will be materially increased. Our towers are nearly all equipped with stairs, so that they are accessible to any one. We are always pleased to have the public visit them, not only because of the pleasure they may derive from the beautiful scenery for miles around, but also from an educational standpoint. Our observers are always very courteous and take pleasure in explaining our system, giving visitors a comprehensive idea of what the State is endeavoring to do to suppress our forest-fire evil.

PROPOSED STATIONS.

I am in hopes that during the coming year we shall have sufficient appropriation to install the following observation stations, thereby practically completing our system:—

Nobscot Hill, Framingham.
Great Meadow Hill, Rehoboth.
Miscoe Hill, Mendon.
Lair Hill, Tolland.
Holcomb Hill, Chester.
Berlin Mountain, Berlin.
Yokums Seat (Pinnacle), Lenox.
Mt. Everett, Mount Washington.

The last three would be maintained jointly by Massachusetts, Vermont, New York, Connecticut and the Federal department.

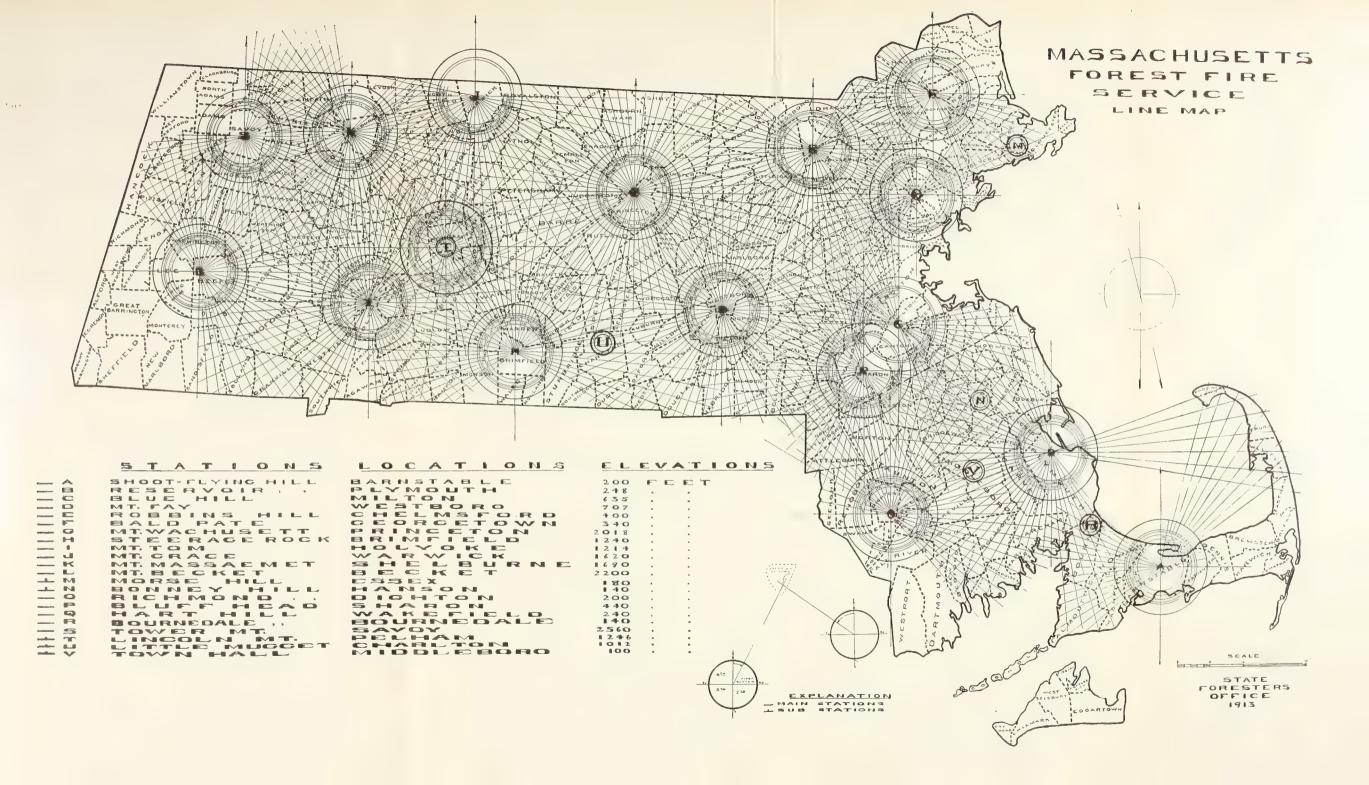
FOREST-FIRE EQUIPMENT.

Under an act of the Legislature, passed in the spring of 1910 and amended in 1914, appropriating \$5,000 annually for forest-fire protection, towns with a valuation of \$1,750,000 or less are entitled to 50 per cent. reimbursement on all forest fire-fighting equipment they desire to purchase not exceeding \$500, no town being allowed an amount exceeding \$250. All forest-fire equipment purchased under this act is approved by this department and placed under the supervision of the town forest warden, subject to inspection at all times by the State Fire Warden or the district forest wardens.

There are at the present time 165 towns entitled to reimbursement under the act. Of this number, 120 towns have expended a portion, and in some instances all, of their allotment, as is shown in our inventory of equipment on page 50. Nearly all the towns throughout the eastern part of the State that come under the act have taken advantage of it, but we still have many towns in the central and western portions of the State that have not. We limit the towns to the purchase of equipment that is suitable for forest-fire work, such as motor trucks, fire wagons, pumps, extinguishers, water cans, pails, shovels, brooms, etc. Owing to the financial condition of many of our smaller towns it has been extremely hard this year to get appropriations for purchasing forest-fire equipment. Our table on page 54 shows, however, that 50 towns have taken advantage of the act and have been reimbursed to the amount of \$2,127.05.

RAILROAD FIRES.

It is certainly very gratifying to note the marked improvement that has been made during the past three years by the railroads throughout the Commonwealth in endeavoring to lessen the number of forest fires





caused by locomotives. For the past two years this department, in cooperation with the Public Service Commission, has maintained a system of inspection of spark arresters and ash pans at the different railroad terminals in the State, and the inspections made this year certainly show that extra precautions have been taken by the railroad officials to keep their ash pans and screens in perfect condition. While we have found defects, they have been mostly minor ones and have been promptly repaired. In nearly all instances the railroads have complied with the law relative to keeping the right of way free from all combustible material, and several miles of lands adjoining the right of way have been thinned out so that where this work has been done there is very little danger of fire making much headway in case it should start.

The reports show that the percentage of railroad fires has been reduced to 26 per cent. and the loss to \$16,000, which is the lowest railroad fire damage of which we have any record. With over 2,000 locomotives in operation we must expect a certain percentage of fires from this source, but the efforts put forth by the railroads show that they can be reduced to a minimum, and I feel that due acknowledgment should be given to Mr. E. A. Ryder of the Boston & Maine, Mr. R. D. Smith of the Boston & Albany, Mr. Chas. B. Rood and Mr. G. W. Wildin of the New York, New Haven & Hartford for their hearty co-operation with this department. Our reports show that we have had 830 railroad fires, as follows: New York, New Haven & Hartford, 389; Boston & Albany, 128; Boston & Maine, 253; and Central Vermont, 60, burning over a combined area of 4,508 acres, with a damage of \$16,649 and a cost to extinguish of \$4,884.

The following information has been received from the Boston & Maine and Boston & Albany railroads relative to fire-prevention work done by them during the past year:—

Boston & Maine Railroad, Department of Fire Claims, Boston, Mass., Dec. 21, 1914.

Mr. M. C. Hutchins, State Fire Warden, Boston, Mass.

Dear Sir:—In accordance with your request for information regarding the fire-prevention work done by this company during the past season, we beg to submit the following:—

Although there was a greal deal of snow last winter, which remained up to the middle or last of March, the high winds immediately following its departure made everything extremely dry, and conditions were favorable for fires. In April, May and June it was hot and dry, and there were many fires; in July and August there was considerable rain, and we had reports of only 98 fires on the whole system in July and 45 in August; but September, October and November were generally dry,—in fact, the weather was much like real summer days, and fires were numerous. There was a very noticeable increase in the number of reports of fires as soon as the hunting season opened, and it was most fortunate that His Excellency Governor Walsh was so quick to scent the danger and prompt in taking steps to relieve it. Comparing this season with the very bad season of 1913, they average about the same, although this season the fires supposed to have been set by sparks from locomotives have not shown as much damage, which we think is accounted for in a large measure by the prompt discovery and fighting of fires.

Since the 1st of last March we have secured 16 permissions from the owners of land adjacent to our property in Massachusetts to clear back a strip for say 100 feet from our right-of-way fence, and this work has been completed. We hope the new Massachusetts law which will take effect Jan. 1, 1915, requiring operators to clear back the brush for a distance of 40 feet from our right of way will be of great assistance in keeping down the fire hazard, as a similar law in New Hampshire, with the prescribed distance only 25 feet, has certainly produced good results, and when owners or operators have been clearing the slash we have in many cases persuaded them to remove it a greater distance than required by law.

In addition to the customary inspection which is made of the spark arrester and ash pan on all our locomotives, since March 1, 1914, we have requested special inspections made of 433 locomotives reported as setting fires, with the result that only 56 were found to have any defect, most of these being very slight. We mention this only to show that the matter of inspection of locomotives is receiving more than routine attention.

Last June we placed a "fire warning" card in all of our principal stations and terminals, believing it is absolutely necessary to keep fire prevention constantly before the eyes of the public. While it is difficult for any one to really know how much value there is in publicity, from remarks we have heard, and the many inquiries we have received from various people, about this subject we feel positive that it is beneficial; for instance, the superintendent of schools in Winchester, Mass., requested a supply of these cards so that the subject could be discussed with and placed before the school children in his town.

During the past season we have given special attention to improving the patrol service in dangerous sections on our system, and the result has been very gratifying to us.

During the past year much more effective co-operation has been attained with the towns in the matter of discovering and promptly fighting fires, and we are pleased to speak most highly of the faithful attention of the "lookout" men and the splendid work of the fire wardens. The bills from the towns for fighting fires are now rendered promptly after each fire, properly made out on the standard form, with explanation of the detail, which assists us in approving their payment. Practically every town with which we have had dealings has accepted the rate of 25 cents an hour for fighting fires; and all this co-operation and assistance is in a large measure the result of the splendid efforts on the part of your district chiefs.

Yours truly,

E. A. Ryder, Commissioner.

Statement by the Boston & Albany Railroad (New York Central Railroad Company, Lessee).

The Boston & Albany Railroad, during the year 1914, reduced both the number and extent of the fires on its right of way and adjoining property, the number of fires reported being the smallest since 1908. The co-operation of the employees of the company and the fire wardens in the cities and towns through which the railroad runs contributed largely to this result. There have been no extensive forest fires along the line of the road during the present year.

All buildings have been equipped throughout with fire extinguishers of an approved type, hand grenades, fire buckets, with tubs filled with water and painted red and marked "For use in case of fire only." Regular periodical inspection of this equipment is made, and instructions are in

effect that the fire buckets and tubs are not to be obstructed or used for any other purpose.

The use of wooden shingles has been discontinued altogether, and adjacent to the right of way all new roofs are now covered with either asbestos shingles, slate or tin. Fireproof paint has been used to a considerable extent in the interior of buildings.

Special zinc-lined receptacles have been provided outside of buildings where stoves are used, for taking care of ashes and cinders from the stoves.

Regular inspection is made underneath all wooden platforms, and all rubbish and paper refuse, etc., is removed.

Instructions are in effect that the right of way shall be carefully and completely burnt over at least twice a season, and oftener if necessary; and that such operations shall be carried on in co-operation with the local fire warden, and if necessary with owners of adjacent property. In some cases where there has been added risk, permission from owners of adjacent property has been obtained and railroad employees have done the burning. In places where the likelihood of fire is great, additional vigilance is used, and in some places patrols are placed. Section cars within the zones most subject to fires are all furnished with approved extinguishers, which are carried at all times on the car during the season fires are most likely to occur. On many occasions these have been found to be of great service.

All Boston & Albany locomotives are now equipped with a standard smoke-box arrangement with netting, which has been approved by the Public Service Commission of Massachusetts. The ash pans have wire screens to prevent live coals and cinders from being thrown out onto the tracks or right of way, and comply with the regulations of the Public Service Commission. All the locomotives operating on the Newton circuit are equipped with special patented exhaust pipes, which soften the exhaust and greatly reduce the number of sparks thrown from the stacks. On some of the locomotives the overflow pipes from the injectors have been relocated so as to discharge into the ash pans, thus cooling off the hot cinders in the pan. The smoke-box netting of all the locomotives is inspected at regular intervals and corrected before the locomotive is allowed to go into service. A number of locomotives used in switching in yards are equipped with fire extinguishers according to law and in compliance with orders of the Public Service Commission, and all car and locomotive shops are equipped with fire extinguishers and fire hose, with special men designated to man this hose in case of fire. Fire drills are also had at regular intervals.

FEDERAL CO-OPERATION.

The co-operative work carried on in the State in connection with the Federal department in protecting the watersheds of the Nashua, Chicopee, Miller, Thames, Blackstone, Hudson, Connecticut and Deerfield rivers has allowed us to better protect the central and western portions of the State than would have otherwise been possible. An allotment of \$2,500

was made to us by the Federal department for this purpose, to be expended in payment of observers. This practically maintained our observation stations west of the east line of Worcester County. I am in hopes that as we extend our observation system in this portion of the State this allotment may be increased to meet, at least partially, the increased cost of maintenance.

Co-operative Forest Fire Conference.

Through an invitation extended by this department to the State foresters of the New England States, New York and Pennsylvania, and the Federal department, a co-operative forest fire conference was held in this city on Jan. 20, 21 and 22, 1914, at which the following program was carried out:—

January 20, Morning Session, 9 A.M.

Chairman, State Forester F. W. RANE.

The "Weeks Law," Co-operative Fire Protection and Federal Requirements in its Administration, Mr. J. G. Peters of the United States Forest Service.

Lookout System, Telephone Construction and Telephone Contracts, Mr. Wm.

G. Howard, New York.

Afternoon Session, 1.30 P.M.

Chairman, Mr. W. O. FILLEY of Connecticut.

Interstate Co-operation in the Reporting of Forest Fires, Mr. F. W. Rane.
Co-operation with Rural Mail Carriers, Mr. Blaine S. Viles, Maine.
Forest Fire Patrol, and Co-operation with Private Owners, Mr. E. C. Hirst, New
Hampshire.

January 21, Morning Session, 9 A.M.

Chairman, Mr. E. C. Hirst.

Publicity as a Valuable Adjunct in Forest Fire Prevention Work, Mr. Chas. P. Wilber, New Jersey.

Slash Disposal, Fire Lines and Trails, Mr. A. F. Hawes, Vermont. Methods of handling Severe Forest Fires, Mr. Wm. G. Howard, New York. General Discussion of Unassigned Topics.

Afternoon Session, 1.30 P.M.

Chairman, Mr. A. F. HAWES.

Railroad Fire Protection, Mr. W. O. Filley, Connecticut: —

- (a) Equipment of locomotives with suitable fire protective devices.
- (b) Methods of securing satisfactory inspection of railroad rights of way and provision for the removal of all inflammable material from the same.
- (c) Railroad fire lines.
- (d) The disposal of slash on privately owned lands adjacent to railroad rights of way or highways.
- Representatives from the New York, New Haven & Hartford, Boston & Maine, Boston & Albany and New York Central & Hudson River, Central Vermont and Rutland railroads were in attendance during this discussion.
- Reception at New American House, 5.30 p.m. Banquet, 6 p.m. Mr. F. W. Rane, Toastmaster.

Addresses by Mr. E. A. Ryder of the Boston & Maine Railroad, Mr. C. N. Woodward of the New York, New Haven & Hartford Railroad, Mr. J. H. Foster of the New Hampshire State College, Mr. Harris A. Reynolds, Secretary of the Massachusetts Forestry Association, Mr. A. F. Hawes, State Forester of Vermont, and others.

January 22, Morning Session, 9 A.M.

Mr. W. L. Larry of the Massachusetts Public Service Commission in charge. Inspection of the different style spark arresters used by the Boston & Maine and New York, New Haven & Hartford railroads, including the Mudge-Slater and the Stearns spark arresters.

Afternoon Session.

Mr. M. C. Hutchins, Massachusetts State Fire Warden, in charge.

Inspection of observation tower and equipment, also modern forest-fire wagon, at South Hanson.

Among those present were Mr. Robert S. Conklin, Commissioner of Forestry, Harrisburg, Pa., Mr. Jesse B. Mowry, Commissioner of Forestry, Chepachet, R. I., Robert M. Ross, State Fire Warden, Burlington, Vt., Allen Chamberlain and Harris A. Reynolds representing the Massachusetts Forestry Association, as well as many representatives of woodland owners, who took part in the discussions. A very interesting and instructive meeting was enjoyed.

FOREST WARDEN CONFERENCES.

During the months of February and March this department held a series of forest warden conferences throughout the State. These were held at Pittsfield, Greenfield, Worcester, Fitchburg, Springfield, Haverhill, Middleborough and Boston. The object of the meetings was that employees of the department might get in closer touch with the town forest wardens and selectmen, and discuss with them the different methods of handling forest fires, the organizing of forest fire-fighting crews, the appointing of deputies located in the outlying portions of the different towns, and the importance of procuring suitable equipment for handling forest fires.

These meetings were very instructive and were attended by nearly all the forest wardens throughout the State, each one being free to discuss matters pertaining to his locality. Short talks were given by members of this department on the general outline of the system and work. Mr. E. A. Ryder of the Boston & Maine Railroad and Mr. Chas. B. Rood of the New York, New Haven & Hartford Railroad were in attendance, and explained fully what these railroads are endeavoring to do in order to lessen the expense caused by railroad fires.

The following law enacted this year relative to the disposal of slash and brush is a forward step toward reducing our forest-fire hazard. While the law is not as broad and as far-reaching as I would desire, at the same time it will necessitate the removal of much dangerous slash accumulating along highways and railroad rights of way, and will protect areas adjoining land where wood and lumbering operations are being carried on.

ACTS OF 1914, CHAPTER 101.

An Act relative to the Disposal of Slash or Brush following Wood or Lumber Operations.

Section 1. Every owner, tenant or occupant of land, and every owner of stumpage, who cuts or permits the cutting of wood or timber on woodland owned or occupied by him or on which he has acquired stumpage by purchase or otherwise, and which borders upon the woodland of another or upon a highway or railroad location, shall clear the land of the slash and brush wood then and there resulting from such cutting for such distance, not exceeding forty feet, from the woodland of such other person, highway or railroad location as the local forest warden shall determine, and within such time and in such manner as he shall determine.

Section 2. Any person who cuts or causes to be cut trees or brushes or undergrowth within the limits of any highway or public road shall dispose of the slash and brush wood then and there resulting from such cutting within such time and in such manner as the forest warden of the city or town wherein such cutting is done shall determine.

Section 3. Whoever neglects to comply with the directions of the forest warden with regard to the disposal of slash and brush, as provided in sections one and two of this act may be punished by a fine of not less than five dollars nor more than fifty dollars.

Section 4. This act shall take effect on the first day of January in the year nineteen hundred and fifteen.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT.

Town.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	ReimBurse- ment.
Acushnet, .	1	10	16	-	-	-	4	1	_	-	-	21, 3	\$250 00
Ashburnham,	-	-	8	-	-	-	-	-	-	-	-	-	25 00
Ashby,	-	-	36	-	-	-	2	2	-	6	_	-	115 70
Ashfield, .	-	-	33	-	-	-	-	-	-	-	-	_	99 00
Ashland, .	-	12	10	-	-	-	12	6	-	6	12	_	77 91
Auburn, .	-	-	83	-	-	-	-	-	-	-	-	-	249 00
Avon,	-	10	-	-	-	-	12	-	-	-	-	-	9 90
Becket,	-	14	16	-	-	-	-	2	-	-	24	-	79 50
Bedford, .	1	14	24	-	-	-	-	-	-	-	-	12	249 67
Belchertown,	-	-	40	-	-	-	-	1	-		-	1	175 87
Bellingham, .	-	16	23	-	-	-	6	-	-	8	-	11	122 92
Berkley,	-	36	24	-	-	-	-	-	-	-	-	-	162 00
Berlin,	2	10	38	-	-	1	12	-	3	12	-	11	241 45
Blandford, .	-	1	16	-	-	-	-	-	-	-	-	-	59 80
Bolton,	-	14	`27	-	-	-	6	-	-	6	-	-	107 15
Boxborough,	1	12	30	-	-	2	-	-	3	4	3	11	182 80
Boxford, .	-	-	16	-	-	-	-	-	-	-	-	-	45 60

¹ One-horse.

² Two-horse.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Continued.

				101		Oncor		•					
Town.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Boylston,	_	-	66	_	_	_	24	_	_	28	_	- 1	\$243 61
Brimfield,	_	10	30	-	_	-	-	-	-	_		_	99 75
Burlington,	-	-	20	-	-	-	- 1	-	-	-		-	100 00
Carlisle,	2	15	19	-	2	-	6	-	1	6	-	1 2	247 72
Charlton,	-	-	77	-	-	-	40	-	1-	60	-	-	250 00
Chatham,	2	15	11	-	2	3	4	-	3	5	-	11	152 98
Chester,	-	37	15	-	-	-	-	5	-	_	12	- 1	97 02
Chesterfield, .	-	-	25	-	-	-	-	-	-	-	-		75 00
Cummington, .	_	-	12	-	-	-	-	-	-	-	-	-	64 50
Dana,	-	-	6	-	-	-	-	-	-	-	-	_	18 75
Dighton,	2	8	18	-	1	-	-	-	2	2	18	11	117 79
Douglas,	_	25	50	-	-	-	-	-	-	-	-	-	175 00
Dunstable,	2	25	10	-	1	-	4	-	3	6	6	11	106 14
East Longmeadow,	2	-	18	-	2	-	12	1	-	4	-	11	153 96
Edgartown,	2	5	10	-	2	3	4	-	3	5		11	152 17
Enfield,	-	20	-	l -	-	-	-	-	-	-	1-	-	1 50
Erving,	-	-	25	6	-	-	-	-		18	1	-	86 52
Essex,	-	24	12	-	-	-	-	-	-	-	-	-	37 80
Florida,	-	-	8	-	-	-	-	-	-	-		-	26 00
Freetown,		24	20		-	-	-	2	-	72		-	167 48
Georgetown, .	-	30	54	-	_	-	-	-	6	12	-	-	194 08
Gill,	-	5	20	-	-	-	-	-	-	-	-	-	65 00
Goshen,		12	58	-	-	-	-	-	-	-	-	-	244 05
Granby,	-	12	12	-	-	-	-	-	-	-	-	-	39 90
Granville,	-	-	-	-	-	-	-	-	-	-	-	21	130 00
Greenwich,	-	-	18	-	-	-	-	-	-	-	-	-	60 45
Groveland,		6	12	-	_	-	- 1	-	3	12	-	-	51 05
Hadley,	-	-	15	_	-	-	-	-	-	-	-	-	75 00
Halifax,	-	12	64	-	-	-	12		-	18	-	11	241 91
Hampden,	-	-	12	-	-	-	-		-	-	-	-	39 00
Hanson,	-	6	24	-	-	-	6	-	-	5	-	21, 3	250 00
Harvard, ·	2	7	29	-	2	3	-	-	3	12	-	12	250 00
Harwich,	-	-	-	-	-	-	-	2	-	-	-	-	8 50
Holbrook,	-	12	10	-	-	-	-	-	-	-	-	-	69 00

¹ One-horse.

² Two-horse.

³ Motor truck.

Inventory of Equipment purchased under the Reimbursement Act — $\operatorname{Continued}$.

					1101			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
Town.		Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Holland, .		-	-	8	-	-	-	-	-	-	-	-	-	\$25 00
Hubbardston,		-	-	52	-	-	-	18	-	-	4	-	-	175 75
Laneshorough,		-	5	-	-	-	-	-	3	-	-	36	-	26 50
Leverett, .		2	20	16	8	2	4	-	-	4	8	-	21	160 17
Leyden, .		8	10	4	9	-	-	-	-	4	4	-	-	22 35
Lunenburg, .		2	36	10	-	2	3	4	-	3	29	-	11	160 37
Lynnfield, .		-	35	20	-	-	-	-	10	-	-	6	21	249 95
Mashpee, .		_	-	22	-	-	-	-	_	-	12	-	11	124 80
Mendon, .		_	24	21	-	-	-	-	-	-	-	30	11	170 22
Merrimac, .		-	-	15	-	-	-	-	-	-	-	-	-	75 00
Middleton, .		-	-	16	-	-	-	-	-	-	-	-	-	49 50
Millis,		-	-	8	-	-	-	-	-	-	-	-	12	242 00
New Braintree,		-	-	37	-	-	-	-	-	-	-	-	-	120 97
Newbury, .		-	-	6	-	-	-	-	8	-	-	12	-	55 90
New Salem, .		-	55	20	-	-	-	-	-	-	-	-	-	100 50
Norfolk, .		-	-	18	-	-	-	-	-	-	-	-	-	99 00
North Reading,		-	-	38		-	-	-	-	-	-	-	11	248 43
Northborough,		-	-	25	-	-		-	-	-	-	-	-	102 37
Norwell, .		6	-	32	-	-	-	12	-	-	12	-	11	250-00
Oakham, .		-	12	30	-	1	1	6	-	3	3	-	11	222 97
Otis,		-	5	10	-	-	-	-	-	- 1	-	-	-	62 50
Paxton, .		3	-	28	12	-	-	-	-	-	6	-	-	105 87
Pelham, .		-	-	19	-	-	-	-	5	-	-	-	-	84 12
Pembroke, .		-	-	31	-	-	-	60	-	-	-	-	12	250 00
Petersham, .		2	10	36	-	2	3	4	-	3	5	-	11	248 05
Phillipston, .		-	36	38	-	-	-	-	1	-	-	-	-	130 15
Plainville, .		2	10	22	-	2	3	4	-	3	5	18	11	225 00
Plympton, .		-	-	-	-	-	-	-	12	-	-	-	-	20 93
Prescott, .	.	-	-	10	-	-	-	-	-	-	-	-	-	48 16
Princeton, .		-	32	80	-	-	-	-	-	-	-	-	-	249 20
Raynham, .		3	46	30	-	6	3	12	-	9	15	-	31	222 23
Rehoboth, .	.	-	10	48	-	-	-	-	-	-	-	-	11	250 00
Richmond, .		-	15	25	-	-	-	4	-	-	-	-	-	86 20
Rochester, .		-	24	60	-	-	-	-	-	-	30	-	-	205 37
Royalston, .	.	3	10	22	30	2	2	12	-	-	42	-	11	145 10

¹ One-horse.

² Two-horse.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Concluded.

Town. Second Part Part
Rutland, 12 18 6 12 250 0 Salisbury, 3 - 9 - 6 - 24 6 38 8 Sandwich, 22 12 36 2 24 - 11 245 6 Shelburne, 50 12 6 - 11 186 8 Shirley, 48 36 12 6 - 13 8
Salisbury, 3 - 9 - 6 - 24 6 38 8 Sandwich, 22 12 36 2 24 - 11 245 6 Shelburne, 50 12 6 - 11 186 8 Shirley, 48 36 139 8
Sandwich, 22 12 36 2 24 - 11 245 6 Shelburne, 50 12 6 - 11 186 8 Shirley, 48 36 139 8
Shelburne, 50 12 6 - 11 186 8 Shirley, 48 36 13 8
Shirley, 48 36 139 5
Shutesbury, 16 25 87 5
Southwick, 12 26 11 101 8
Sterling, 25 18 12 241 1
Stow, 42 18 131 3
Sturbridge, 11 35 116 4
Sudbury, 40 250 (
Sutton, 50 50 24 32 24 188 4
Tewksbury, 2 - 24 - 2 30 - 11 174 (
Tolland, 4 - 4 - 182
Townsend, 46 250 (
Tyngsborough, 220 20 54 12 24 36 - 250 0
Tyringham, 2 10 10 - 2 - 10 - 2 3 - 12 112 3
Upton, 30 12 11 235 2
Wales, 2 - 40 - 2 2 11 236 7
Warwick, 6 10 11 154 5
Washington, 10 3 6 8 - 11 86 9
Wendell, 38 27 - 2 - 12 18 - 11 163 2
West Boylston, 107 250 (
West Bridgewater, 20 11 200 1
West Brookfield, 12 37 121 7
West Newbury, 8 13 68 7
Westhampton, 16 48 (
Westminster, 77 48 24 24 24 244 -
Wilbraham, - 27 32 - - 23 - 12 6 - - 118 3
Wilmington, 12 40 - 1 - 18 - 34 187 3
Windsor, 40 200 (
Worthington, . 2 15 10 3 5 - 11 86 (
Wrentham, 12 30 4 11 250 (
Totals, 83 1,484 3,143 116 44 42 407 137 129 712 247 54 \$17,012

¹ One-horse.

² Two-horse.

³ Motor truck.

Towns receiving Fire-equipment Reimbursement during Year 1914.

	_							
Acushnet, .			\$106 78	Lanesborough,			\$26	5 5 (
			81 20	Leyden, .			22	38
Ashland,			60	Lunenburg,			11	08
Becket,			51 25	Lynnfield,			3	70
Belchertown, .			4 25	Mashpee, .			50	00
Bellingham, .			9 75	Mendon, .			80	22
Berkley,			18 00	New Braintree,			44	10
Bolton,			48 75	Newbury,			37	75
Boxborough, .			2 34	Norwell, .			6	13
Boylston,			167 41	Oakham, .			32	12
Charlton,			28 63	Otis, .			2	50
Chester,			97 02	Pelham, .			7	50
ummington, .			64 50	Petersham,			45	50
Dighton,			9 12	Phillipston,			81	50
East Longmeadow,			4 25	Plainville,			41	50
Edgartown, .			152 17	Southwick,			19	50
Enfield,			1 50	Tolland, .			18	26
Essex,			37 80	Tyngsborough,			60	20
Florida,			26 00	Washington,			66	92
Georgetown, .			59 25	Wendell, .			128	17
Goshen,			122 32	West Newbury,			35	00
Granby,			90	Westminster,			1	87
Hampden, .			39 00	Windsor, .			50	00
Harvard,			48 48	Wrentham,			39	90
Harwich,			8 50			-		
Holland,			25 00	Total,			\$2,127	0.5

Forest Fires of 1914.

	Mon	rns.		Number.	Acres.	Cost to extinguish.	Damage.
December,	191	3.		 2	19	\$85 71	\$175 00
January,	191	4.		2	16	25 90	15 00
February,				1	. 1	1 80	10 00
March,				67	99	91 91	15 00
April, .				857	6,929	5,768 22	17,554 00
May, .				516	6,557	6,077 67	19,383 00
June, .				298	2,258	4,699 64	6,144 00
July, .				65	231	755 92	1,240 00
August,				41	827	460 96	518 00
September,				302	3,348	6,115 64	8,609 00
October,				821	17,412	22,079 41	38,141 00
November,				209	1,278	2,587 47	3,585 00
Totals,				3,181	38,975	\$48,750 25	\$95,389 00

Total, . . .

\$95,389

TYPES	OF	LAND	BURNED	OVER	(Acres).
-------	----	------	--------	------	----------

Timber, .										. 3,001
Second growth,										. 9,016
Second growth,	not r	nerch	antab	le,						. 7,943
Brush, .										. 11,645
Grass, .										. 2,510
Not classified,										. 4,860
Total, .										. 38,975
				~			_			
		TYI	ES (of Ci	LASSII	FIED	DAM	AGES.		
Standing trees,										\$50,697
Lumber, logs ar										. 14,427
Buildings, bogs,										. 3,530
8-,8-,										
Bridges, fences,										. 331
Bridges, fences, Not classified,										. 331

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST FIVE YEARS.

	YF	AR.		Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910,				1,385	42,221	\$23,475	\$205,383	30.46	\$148 29
1911,				2,536	99,693	47,093	537,749	39.31	226 24
1912,				1,851	22,072	20,219	80,834	11.92	43 67
1913,				2,688	53,826	35,456	178,357	20.02	66 35
1914,				3,181	38,975	48,750	95,389	12.25	29 98

CLASSIFIED CAUSES OF FOREST FIRES FOR THE PAST THREE YEARS.

		19	12.	19	13.	19	14.
Causes.		Num- ber.	Per Cent.	Num- ber.	Per Cent.	Num- ber.	Per Cent.
Unknown,		649	35.1	650	24.2	1,174	37.0
Railroad,		640	34.6	913	34.0	830	26.0
Burning brush,		93	5.0	148	5.5	196	6.2
Hunters and smokers,		223	12.0	386	14.3	520	16.4
Steam sawmills, .		8	.4	6	.2	3	.1
Children,		79	4.3	109	4.1	140	4.4
Miscellaneous,		159	8.6	476	17.7	318	9.9
Totals,		1,851	100.0	2,688	100.0	3,181	100.0

PRECIPITATION IN INCHES FOR THE YEARS 1911, 1912, 1913, AND 1914, WITH DECEMBER OF PREVIOUS YEAR.

	Me	ONTH	s.		1911.	1912.	1913.	1914.	Normal.
December,					3.24	2.59	5.73	3.66	3.74
January,					3.07	3.87	3.21	4.30	4.12
February,				.	3.20	2.24	3.77	3.52	3.97
March,					3.27	5.26	5.32	4.20	4.34
April, .					2.86	4.05	4.73	5.51	3.46
May, .					.89	4.03	2.85	2.95	3.37
June, .				 .	4.76	.53	3.20	1.75	3.07
July, .				.	4.55	4.16	2.00	3.38	3.65
August,				.	6.70	3.85	3.30	4.59	3.70
September,				.]	3.36	1.71	2.77	.45	4.36
October,				. [3.01	1.52	7.62	2.03	4.13
November,				.	5.71	3.45	2.70	3.06	3.96
Totals,					44.62	37.26	47.20	39.40	45.87

Our comparative tables on page 55 are very interesting, showing comparative fire losses for the past five years, comparative causes for the past three years, the number of forest fires by months, and the rainfall by months during the past year. Nearly 2,000 of our fires, classed as "unknown," "hunters" and "children," can be attributed to carelessness. It is certainly unfortunate in this enlightened age that pleasure seekers who are allowed the free use of the thousands of acres of forested area in the State will not use at least a little precaution when traveling through the woods, and not throw down lighted matches, cigarette stubs and cigar butts. We have had many prosecutions and convictions for violations of the fire laws, but it is almost impossible to convict the person who is traveling through the woods alone, as while we are satisfied in our own mind that he is the cause of the fire we have no evidence whatever that will convict him.

The permit law has been enforced quite generally throughout the State and is giving general satisfaction. Over 20,000 permits have been issued. While a few towns have not accepted this act I am in hopes that legislation may be enacted bringing all towns under its provisions.

Twelve thousand copies of the following fire notice, quoting extracts from the fire laws, have been posted throughout the forested area of the State:—



Spruce woodland, Cummington, Mass., before thinning.



Light thinning in spruce woodland, Cummington, Mass.



FOREST FIRES.

Your help is absolutely necessary if we are to prevent woodland fires. Do not throw down lighted matches, cigars, or cigarettes. Notify the nearest Forest Warden or Deputy in case of fire, and get busy yourself.

Good Citizens will be Cautious.

Others are hereby

WARNED

Setting fire to growing wood or timber of another.

Punishable by a fine of not more than \$100 or by imprisonment for not more than six months. R. L. 208, Sec. 7.

Letting Fire Escape.

Negligently allowing fire to escape from your own land to adjoining land. Punishable by a fine of not more than \$250, also liable for damages. R. L. 208, Sec. 8 and 9.

Permit necessary.

A permit must be procured from the Town Forest Warden for all fires in the open air between March 1 and December 1, except as provided in Sec. 1, Chap. 244, Acts of 1911. Penalty for violation, not more than \$100 fine or imprisonment for not more than one month, or both such fine and imprisonment.

Penalty for Refusing Aid.

Any person between the ages of 18 and 50 years who refuses, without good cause, to assist the Forest Warden or his Deputies in the fighting of forest fires is liable to a fine of not less than \$5 or more than \$100. R. L. 32, Sec. 21; 1907, 475, Sec. 3.

Auto Parties.

Picnic Parties.

Hunters and Campers.

All persons visiting the forests will be held responsible for any damage they may cause.

F. W. RANE, State Forester,
6 Beacon St., Boston, Mass.

We have experienced considerable trouble with fires just over the town line this year. While we have made improvement along this line during the past three years we still have town officials who refuse to go into an adjoining town and extinguish a small fire, preferring to let it burn up to the line and then endeavor to extinguish it. I feel that our district wardens will in time overcome this jealousy between towns, so that we shall not then have these serious town line fires.

The power sprayers in use by many towns in the suppression of the gypsy and brown-tail moths have demonstrated their value at forest fires, possibly more along the North Shore than in any other portion of the State. During the months of September and October one was located at Beverly, one at Essex and one at Manchester. These were at the disposal of the forest wardens in these towns, and were brought into use at several fires. At a turf fire in Beverly two of them were in use for several days and did very effective work.

As our appropriation for forest-fire protective work is only \$23,000, we have not been able to do as much construction work as we had desired to, but we have made it a point to erect substantial, permanent observation towers in each instance. These towers are all set on cement abutments which go below frost line, and all that is now required, that they may last for years, is painting once in three years. Nine of them have been painted this year.

We are asking for an increase of \$7,000 in our appropriation this year, making a total of \$30,000, which is absolutely necessary if we are to complete our construction work and maintain the present forest-fire policy. It is important that each of the four district wardens be furnished with a suitable truck properly equipped with fire-fighting apparatus, which may be held in readiness for use in case of emergencies. This would enable them to take on ten or more trained fire fighters and go to any serious fire. The above appropriation would allow the purchasing of at least two this year. The importance of such a truck was demonstrated at a fire on Sugar Loaf Mountain, New Ashford, which, after burning thirty-six hours, had assumed such proportions that it was practically beyond control. Owing to the serious fires burning west of the Connecticut River we had shipped to our district forest warden a supply of equipment for his use. This equipment, consisting of pumps, extinguishers, etc., was loaded on an automobile at 10 o'clock at night, and a 40-mile run was made to New Ashford, the district man arriving there about 2 o'clock in the morning. At 7 o'clock that morning 30 men were at work with the equipment on the fire, and before night the fire was under absolute control. This is but one case in many where the town had absolutely no equipment, and without a doubt this fire would have burned over a large area of the Grevlock Reservation if assistance had not arrived at that time. This shows the importance of having equipment, with ways and means of getting to disastrous fires. While many of our towns have sufficient equipment for handling ordinary fires, it is an impossibility for them

to cope with large ones. It therefore seems necessary, if we are to lessen the damage caused by our large fires, that our four district men be provided with suitable apparatus and means of getting it to a fire if the efficiency of their service is to be increased to a maximum.

In conclusion, I desire to express my appreciation of the loyal and hearty co-operation of all employees in this branch of the service.

Respectfully submitted,

M. C. Hutchins, State Fire Warden.

CHESTNUT BARK DISEASE.

This disease, which was mentioned quite fully in last year's report, still continues to spread throughout the State, and at the present time is to be found to a greater or less degree in nearly all places where chestnut is growing. Regardless of the fact that both government and State men have given much time and effort to combat this very virulent tree disease, little has been learned during the past year that would tend to solve the problem of eliminating the disease without eliminating the chestnut trees on an extensive scale. Mr. Roy G. Pierce, the expert on chestnut blight who was connected with this office until July 1, 1914, covered the State quite thoroughly, making examinations, giving advice and lectures, and disseminating knowledge generally in regard to the disease and its workings, so that most woodland owners have at present a very fair idea of what the disease is like.

Clean cutting of all infected specimens is recommended where the disease occurs in woodland areas, and a certain amount of spread can be checked if the trees infected are cut when the cankers first appear rather than after they have girdled and killed the trees completely.

STATE HIGHWAY PLANTING.

At the request of Mr. Pillsbury, division engineer of the Highway Commission, we undertook a piece of work on a line which we have never undertaken extensively before, namely, setting out trees on the highway. After looking over several possible situations it was decided to do the planting on the State road between Ipswich and Newburyport. Eight hundred trees were set out in all, on a stretch of road 10 miles in length,

at a cost, including the trees, of about \$900. The following species and number of trees were planted: Norway maples, 400; white ash, 250; pin oak, 50; linden, 50; oriental plane, 50. Three hundred of the trees were staked, but guards were not put on them, as they stand on a road in the country, and few of them are near houses. The cost analyses are approximately as follows:—

						Per Tree.	Total.
Cost of trees, .						\$0 45	\$356 50
Labor of planting,						40	318 00
Transportation,						10	80 00
Staking materials	(300	trees),				10	32 00
Supervision, .						04	30 00
						\$1 09	\$816 50

MUNICIPAL FORESTS.

It is believed that the time is ripe for many of our Massachusetts towns and cities to make a beginning in establishing a municipal forest. Already a few towns and cities have made a start in the right direction by planting the areas about their source of water supply, but why stop with this when there are in most instances available cheap lands that either already belong to the town or city or can be purchased at a low price. The great good to come from such an enterprise as this can only be appreciated when we take into account the experiences of the municipal forest propaganda of the old world. have succeeded and our chances for success are even greater. If this office can be of any service to any city or town in establishing a municipal forest, we certainly shall consider it a pleasure to serve you. The Massachusetts Forestry Association of 4 Joy Street, Boston, is sending out some very interesting information on establishing municipal forests, and is also offering prizes to cities and towns which make the best showing.

SPECIAL CO-OPERATIVE MOTH WORK.

During the past season the general co-operative work, similar in many ways to that carried on heretofore with the North Shore people, has been executed in several places. The North Shore work is so well in hand, we are happy to report, that the expenditure has been greatly reduced the past season, and we hope to see still further curtailment the coming year, with equally good results.

The town of Dover entered into similar co-operative work over a year ago, and at present the results are extremely satisfactory. It was simply a case of doing the work properly and in time.

Some very effective work has been done in co-operation with those owning cottages about Lake Boon, and at present several undertakings are under way which are being entirely financed by individuals, corporations and municipalities.

MOTH AND FOREST SURVEY OF WINCHENDON

As was slightly alluded to in last year's report, relative to making the town of Winchendon a "Black Forest" town, cooperative plans were agreed upon with Dr. L. O. Howard, representing the United States Department of Agriculture, and Mr. Ralph Zon of the United States Forest Service, whereby a thorough survey of the town was made. This report was submitted and explained to the townspeople at a public meeting called by the selectmen recently. A committee of three citizens was appointed at this meeting to confer with the State and government authorities for further consideration and recommendations.

The goal aimed at is to remove all trees that are the natural food plants of the gypsy and brown-tail moths. This logically carried out will give way to a large acreage of evergreen growth, particularly of white pine and spruce, which are of greater ultimate value. Already the town is well stocked with pine, and it is believed that an experiment on such a large scale—29,000 acres—will be of great value not only to the town itself, but to the State and, in fact, to New England.

It is to be hoped that something definite can be undertaken, as the experiment will be valuable not only in eliminating future moth troubles, but in establishing a coniferous forest on an extensive scale, which economically and æsthetically would prove of great interest.

MOTH WORK IN BOSTON.

When the moth-suppression work was placed under the supervision of the State Forester in 1909 the city of Boston was one of the worst infested districts in the State. The city up to that time had not attempted the work of suppression on a scale sufficient to make any permanent impression upon the insects, and the State had taken the attitude that the funds were not sufficient to be able to compel the city to do what the law requires. With these conditions, it inevitably followed that the trees were stripped bare of their leaves in various sections, and a great many trees died that might have been saved.

The following year, in 1910, this department began a systematic campaign of co-operative work with the city, and that work has progressed until at the present time we are happy to announce that the Boston trees are being as well cared for as any, and that hereafter the State's financial assistance will be relatively small if any. During the past five years the reimbursement from the State to Boston has been \$82,000, and the city has also been at a very heavy expense. Now that the city superintendent, Mr. Wm. F. Long, has the work well in hand with modern spraying equipment, and a corps of trained men, this work should henceforth be kept up to its present standard at relatively small expense. It certainly would be suicidal to allow any indifference to creep in that would tend to lessen this work in Boston in the future. Trees are certainly one of Boston's greatest assets, and now that the conditions are so favorable, it is to be hoped that all Bostonians will uphold the work of Mr. John H. Dillon, chairman, Park and Recreation Department, and Mr. Wm. F. Long, the moth superintendent.

It is with pleasure that I publish the following report of Mr. Long, which points out more in detail Boston's present condition:—

DEC. 19, 1914.

Dear Sir: — In response to your request for a report of the state of the gypsy and brown-tail moth infestations in the city of Boston, including Hyde Park, I would say that up to the present date conditions have been improved about 80 per cent. since we first commenced the suppression work. During each of the last two years we have been able to cover entire city and have had no defoliation. In the past year, particularly, we have made such good headway that we are considering the advisability of doing away with winter destruction and depending entirely upon the spraying treatment.

The woodland conditions of Boston are very good — infestations by gypsy moths very light, brown-tail moths, hardly any.

Hyde Park, which was so badly infested, is in excellent condition at the present time; so, also, are the woodlands of Dorchester and West Roxbury. Charlestown has no gypsy infestations and a very light browntail moth annoyance. East Boston has practically no moth troubles, Boston proper has a very light brown-tail infestation. South Boston has light quantity brown-tail but no gypsy disturbance. Conditions in Roxbury are similar to those prevailing in South Boston. Brighton has very light infestations of both gypsy and brown-tail moths. Jamaica Plain and Forest Hills sections have very light gypsy moth infestations. Dorchester has a light general infestation of gypsy, but very few of brown-tail moths.

A section of our parkway has a bad infestation of gypsy moths, but it can be handled easily. It seems as if all the caterpillars in the neighborhood selected this particular season.

During this past year we have been able to do considerable tree work, cutting out, cementing cavities, etc. The cement work was done principally in the East Boston section, but the removal and pruning was done liberally all over the city, also the roadside work.

Very truly yours,

WILLIAM F. LONG, Foreman.

MOTH WORK IN BROOKLINE.

The town of Brookline has always been ready and willing, not only to co-operate in the moth-suppression work, but has always paid for all expenditures made in the town, although the town could have come under the reimbursement head. Both the moth superintendent, Mr. E. B. Dane, and the

deputy, Mr. Daniel G. Lacy, have put the proper spirit into the work, and they have had a large territory to cover. It is believed that the following report of the work in this town will be of interest:—

Brookline, Mass., Dec. 18, 1914.

Dear Sir: — The following is a report of the condition of the town of Brookline relative to the gypsy and brown-tail moth situation. This past year the sum of \$21,000 was appropriated by the town for insect work on the roadside trees and for private property.

Last winter we had a serious infestation of brown-tail moths, but from January to the middle of March we covered the town and removed the nests. The gypsy moth situation last winter was rather a scattered infestation. This past summer all the roadside trees in the town, about 65 miles in all, were carefully sprayed, and private property which was infested. A recent examination shows us more egg clusters of the gypsy moths in isolated cases than last year, but on the whole the situation is improved.

During the coming winter the entire town, including both roadside and all private property and woodland areas, will be carefully creosoted, and sprayed next spring.

We have very few brown-tail moths this year, and so far in our winter work, covering a period of five weeks, we have not found more than 100 nests of this insect. Last spring we had a considerable number of both varieties of the tent caterpillars, but prompt spraying remedied this condition.

In our recommendation to the town for the ensuing year the amount to be asked for will be larger than this past year, owing to the increase in wages paid, and acceptance by the town of the act giving the employees two weeks' vacation.

The moth situation in Brookline is well under control, as will be shown by the fact that the past two years we did not receive a single complaint on the defoliation of any tree in the town.

Respectfully submitted,

Daniel G. Lacy, Superintendent.

MOTH FIELD DAY IN LINCOLN.

On July 7 a field day was held in Lincoln on the estate of Gen. Charles Francis Adams. This splendid estate comprises upwards of 600 acres, a large portion of which is covered with forest growth. This estate afforded one of the best opportunities to demonstrate moth-suppression work, as it contains a great variety of conditions. One of the finest so-called primeval growths of white pine is found here, while on other sections of

the estate some magnificent specimens of oak and chestnuts can be seen. Mr. Adams has been reforesting and underplanting, as well as thinning and carrying on general forestry management, for several years.

Before the moths began to be destructive in Lincoln Mr. Adams conferred with the State Forester, and co-operative work was undertaken. He has a modern spraying equipment, and was able, through modern methods, to retain the foliage on his trees while adjoining properties have been in most cases stripped.

In order to facilitate matters, and call attention to the varying methods and conditions, placards were posted at various places over the estate, and a printed program explained each.

The State Forester wishes here to acknowledge the splendid interest that Mr. Adams has shown in this work, and to thank him in behalf of the Commonwealth for his hospitality on this occasion, as even the delicious luncheon for all attending was furnished by him.

PROTECTING AND INCREASING BIRDS.

There is an increasing interest on the part of our people in doing what we can to encourage the bird life of our State, and this is commendable. Trees and birds are closely associated in the minds of all naturalists. State and national laws are being enacted to regulate wild life generally, and none are more interested in this work than foresters.

The birds are the guardians of our forest and shade trees and the orchards of the farmer. They are eternally waging a relentless warfare upon the insect hosts that prey upon the foliage, fruit and even the trunks and branches of the trees. In return for this safeguarding the trees themselves offer their hospitable branches as nesting sites for the birds, and stretch over them a canopy of green as a shelter from the oppressive rays of the sun and as a protection against the downpour of rain.

Some species of birds do not build nests among the branches, but excavate holes in the decayed trunks and branches of trees, and still others, not able to excavate homes for themselves, use these vacated apartments of the woodpecker family, and also the nesting boxes offered by their human friends. All of the birds having this nesting habit are of the most beneficial species, from the fact that their food is composed largely of insects, and we should in every possible manner encourage their numbers to increase.

Dead trees and decayed branches are a menace to the health of the forest, and are removed by the forester, who at the same time unwittingly destroys the future nesting site of a woodpecker. In order to provide nesting places, and at the same time promote the welfare of the forest by eliminating these plague spots of beetle and fungus, we must place in open spots, and along the borders of the woods, nesting boxes.

It is the purpose of the State Forester to interest woodland owners and others in building bird houses, or purchasing them from reliable dealers, and seeing that all localities take some part in this fascinating work. Mr. Bradford A. Scudder, secretary of the Massachusetts Fish and Game Protective Association, gives us the proper dimensions and descriptions necessary to build various kinds of bird boxes. Mr. Scudder and his association are very active in the work of caring for birds, having distributed tons of food for them in winter and offering for sale at small cost bird boxes of all kinds, etc.; hence the data which follow are reliable:—

The proper inside dimensions for nesting boxes for the following species are as follows:—

Bluebird. — Depth of box, 10 inches; floor, 5 by 5 inches; entrance, $1\frac{1}{2}$ inches; lower edge of entrance, 7 inches above the floor.

Chickadee. — Depth of box, 10 inches; floor, 4 by 4 inches; entrance, $1\frac{1}{4}$ inches; lower edge of entrance, 7 inches above the floor.

Flicker. — Depth of box, 20 inches; floor, 6 by 6 inches; entrance, $2\frac{1}{2}$ inches in diameter; lower edge of entrance, 16 inches above the floor.

Tree Swallow. — Depth of box, 7 inches; floor, 5 by 5 inches; entrance $1\frac{1}{2}$ inches in diameter; lower edge of entrance, 4 inches above the floor.

The four species enumerated above are the ones most likely to occupy the nesting boxes, for they are found in large numbers throughout Massachusetts. The white-breasted nuthatch and the house wren are not as abundant as the birds just mentioned, but nevertheless each of these should be offered a

home. The bluebird box will suffice for the nuthatch, and that of the chickadee for the wren.

Pine lumber seven-eighths of an inch in thickness, planed on one side only, is good material to use in the construction of these boxes. The rough side of the board should form the inside of the box. Stain the outside, only, a neutral tint of brown or gray. The entrance hole in each instance is circular, and should be cut with an extension bit, which is easily set for the varying size of entrance. Cut the entrance on an upward slant, rather than at direct right angle with the surface. This prevents the rain from driving in, and also simulates the doorway of the woodpecker architect, whose work we are copying. The roof should project an inch and a half in front, but be flush with the sides and back. The top should be removable, so that at the end of the season, after the departure of the birds, the box may be cleaned and any egg clusters of moths that are sometimes deposited there destroyed.

Each nesting box should have a layer of coarse, dry sawdust to the depth of 2 inches placed in the bottom. This is an important detail and should not be overlooked, especially in the box designed for the flicker.

Nesting boxes may be fastened to the trunk of a tree, or one of its large branches, care being taken that no intervening branches will prevent an easy ingress and exit by the occupants of the box. About the borders of fenced land boxes may be fastened to the tops of light poles, 12 feet in length, and these poles may then be fastened to posts in the fence, using lag screws or heavy wire spikes for the purpose. Tree swallows and bluebirds will tenant these boxes and gather their food from the insect hosts of field and orchard.

Do not place the boxes too near one another. Birds of the same species are apt to dispute ownership, so let a space of at least 200 feet intervene between the boxes.

Bird boxes should be placed at a height of not less than 8 or more than 20 feet above the ground. Boxes for the chickadee and house wren may be placed at the first-mentioned height, but for all others a height of at least 15 feet is better.

Bird boxes should have the entrance face the south or southwest, thus preventing the beating in of rain during violent, cold, northeasterly storms that frequently occur during the nesting period.

In placing the nesting boxes in position, have them as nearly vertical as possible. Should they incline at all, let them tip slightly forward rather than backwards.

Boxes designed for bluebirds and tree swallows, and placed in the open where they are exposed to the full glare of the sun, should be painted white, and also have a few quarter-inch holes bored in the sides, about an inch below the top, for ventilation.

Wood is the only suitable material for the construction of nesting boxes, and beards are obtainable anywhere throughout this land of ours, so that by following the above instructions the farmer, the schoolboy and the commuter may construct a bird house that will be accepted by the birds, and at the same time enjoy both the pleasure and the satisfaction of doing the work himself.

Placing the nesting boxes in position after completion does not complete the responsibility of the landlord. The farmer plants corn, but in order to reap a harvest he must remove the weeds that spring up. The same applies to the bird houses. Without watchfulness on our part they will be pre-empted by English sparrows and squirrels, and an unceasing warfare must be waged upon these pests. Number your bird houses and keep a record of the number and kind of species that use them during the season. Numbers may be placed at the foot of the tree or pole upon which the box is placed, or on the bottom of the box itself.

The insect that birds seem to care the least about, unfortunately, is the gypsy moth. Many observations and experiments have been made with a purpose of determining to what extent birds can be depended upon to aid in the control of this insect. It is generally conceded, however, that the gypsy moth is so hairy and, in fact, bristly during its larval stage, when the birds would naturally seek it for food, that it really is objectionable and distasteful to them.

One of the insects that at the present time is very destructive, especially to our shade trees, is the leopard moth. This insect develops into a large, fleshy, boring larva which lies in the branches or trunks of the trees, and the woodpeckers are

our best assistants in devouring them. These birds should be encouraged as much as possible.

There has been much concern in the past about the effect of spraying with arsenate of lead upon bird life, but after a careful study of the subject by Mr. Forbush, the State Ornithologist, he became convinced, as published in his report of 1909, that spraying was a benefit rather than a hindrance to bird life. Where the trees are not sprayed, and defoliation takes place, the birds are the first to leave. Where the foliage is retained by spraying, thus giving shade and protection, here birds are found in large numbers.

For further information on bird-house construction the reader is referred to Farmers' Bulletin No. 609, United States Department of Agriculture, Washington, D. C. This bulletin is sent free upon application and is very valuable.

A new handbook, "The Conservation of our Wild Life," published by the Massachusetts Fish and Game Protective Association, price 35 cents, treats on methods of attracting and increasing our useful birds and the establishment of sanctuaries.

For detailed information on birds in general, of course the reader is referred to Mr. E. H. Forbush, the Massachusetts State Ornithologist, Room 136, State House, Boston, Mass.

After writing the above the following letter was received from Mr. E. C. Ware, Wareham, Mass., which explains itself:—

Dear Sir: — I have some new circulars in the printer's hands at the present time. Boxes now made are for flickers, bluebirds, swallows, wrens and chickadees, and I intend to start on martin boxes in the near future. Price is 35 cents for all boxes except the flicker box, which is 75 cents. All boxes are complete, ready to put up, and stained with a brown oil stain. Twenty-five or more boxes in one order can allow a discount of 25 per cent. Roofs of all boxes are covered with a good grade of roofing paper over the wood, and the entrance hole is faced with zinc to keep the squirrels from doing injury to the box.

THE ARMY WORM OUTBREAK.

One of our native insects which at times appears so abundantly as to be regarded by the farmer and agriculturalist as an extremely dangerous pest, and one against the ravages of which prompt and vigorous action should be taken, is the army worm, *Heliophila unipuncta*. This insect is found from

the Atlantic Ocean to the Rocky Mountains and from Canada to Texas. Fortunately, serious outbreaks of this species are not frequent in Massachusetts.

Beginning about the middle of July, 1914, the State Forester's office began to receive, through the mail and otherwise, many specimens of this insect sent in by citizens from several sections of the State for identification. The large number of insects thus received, together with the receipt of many letters describing it, made it obvious that the State was suffering from an invasion of the dreaded army worm.

On July 28 His Excellency Governor Walsh, recognizing the importance of adopting remedial measures to relieve conditions, addressed to the State Forester the following letter:—

Mr. F. W. Rane, State Forester, 6 Beacon Street, Boston.

Dear Mr. Rane: — My attention has been called to the fact that serious injury is being wrought in various sections of the Commonwealth by the presence of the army worm, which is attacking and destroying crops.

I am of the opinion that your department, acting in co-operation with the Board of Agriculture, should at once request a sufficient number of your local moth superintendents to advise with farmers and others in the communities affected as to the best means of suppressing this destructive pest.

I understand the State Board of Agriculture and your own department have already sent out a large number of notices containing instructions, but it would seem that the situation now would require the employment of active agents in the various sections,

In view of the fact that you have no funds available for this work, I am convinced that this is such an emergency that would justify my asking the Executive Council to supply the sum of money necessary to direct the work of suppressing this pest.

I would also suggest that spraying apparatus owned wholly or in part by the town, or jointly with the State, should be brought into use as far as possible in carrying on this work.

In conclusion, I would also ask that the gypsy moth field agents and inspectors employed by your department be given instructions to aid and co-operate with the local moth superintendents in the infested areas. I would suggest that the widest publicity be given to the presence of the army worm in the Commonwealth, because it is a well-known fact that if precautions are taken the harm and injury wrought by this pest can be minimized.



Fighting the army worm. One of the simplest and most effective methods of checking the spread of the army worm is to plow a furrow in advance of their march. They fall into this trench and are unable to get out. Taken at Bridgewater, Mass.



Upon receipt of the above letter the State Forester caused a circular letter to be sent to the mayors of cities and selectmen of towns, informing them of the purpose of the Forestry Department to co-operate with them in suppressing the pest. The form of the letter follows:—

Gentlemen: — By request of His Excellency Governor Walsh, this department will co-operate with cities and towns in suppressing the so-called army worm, which in some sections of the State is causing serious damage to crops. Local superintendents will be asked by this department to aid property owners in suppressing this insect. If it is found necessary to incur any expense in carrying on this work such expense will be borne by the Commonwealth. Local superintendents have been advised by agents of this department that all bills, after being approved by the division superintendent, must be forwarded to the office of the State Forester. It is distinctly understood that no part of such cost shall be borne by the city or town wherein the work is performed.

Very truly yours,

F. W. Rane, State Forester.

Instructions were immediately given to the State field agents, employed in the gypsy and brown-tail moth work, to render to cities, towns and private owners within their respective districts all possible aid in the work of extermination.

The thorough training of the gypsy moth men in insectsuppression work, and the fact that the moth department of each city and town is well equipped with spraying apparatus, made it possible to apply quickly and effectively the necessary measures of suppression. The presence of the army worm was reported to the State Forester's office from the followingnamed towns:—

Abington.	Brockton.	Fairhaven.
Arlington.	Carver.	Fall River.
Athol.	Chatham.	Falmouth.
Attleboro.	Chelmsford.	Gloucester.
Barnstable.	Cohasset.	Halifax.
Berkley.	Dartmouth.	Hanover.
Boston.	Dighton.	Hanson.
Bourne.	Duxbury.	Harvard.
Braintree.	East Bridgewater.	Harwich.
Brewster.	Easton.	Hingham.
Brighton.	Edgartown.	Holbrook.

Oak Bluffs. Somerset. Longmeadow. Taunton. Mansfield. Pembroke. Tisbury. Medford. Plymouth. Plympton. Topsfield. Middleborough. Raynham. Wareham. Milford. West Boylston. Rochester. Nantucket. West Bridgewater. Newbury. Rockland. Weymouth. Rockport. North Andover. Whitman. Northbridge. Salisbury. Scituate. Worcester. Norton. Norwell. Seekonk.

STATE FORESTER'S EXHIBIT AT THE PANAMA-PACIFIC EXPOSI-

An appropriation of \$3,000 was made this department by the Board of Managers for Massachusetts for making an exhibit at San Francisco. This has been spent in getting together the following material:—

(1) A large relief map of the whole State in which the forest and agricultural areas are shown. The forest-fire lookout stations are all located on this map by miniature towers; also the various State and private reservations are painted in. The State Forester was fortunate in securing the services of Mr. Warren Manning, landscape architect, of Boston, who had full charge of the construction. This map is 15 feet long by 6 feet wide, and is the exact size of the United States geological maps. This map will prove of great value after the exposition is over, as it can be used for many purposes by this department.

A duplication of this map was also made for the State Board of Agriculture, which has been colored to show the lands adapted for general agriculture in contrast to the present conditions as shown on the forestry map. The two maps are to be in adjoining booths at the exposition, which will add to their value.

- (2) A fully equipped Massachusetts forest-fire wagon, similar to those used in our towns.
 - (3) A miniature steel lookout station of our own design.
- (4) A large-sized, fully equipped power sprayer, a facsimile of those constructed and used in the moth work in Massachusetts.

- (5) Two cases of colored transparencies, each containing 48 pictures, showing Massachusetts forestry and moth conditions and work. These pictures are each 8 by 10 inches in size, and electric fixtures are so arranged that the artificial light brings out their coloring.
- (6) Several large sketches of typical Massachusetts scenery painted in colors by Mr. Manning will be used on the wall space.
- (7) Various maps and placards, showing forestry data, publications, etc.

This material is all of such a nature that it can be used in this department when the exposition is over.

NATIONAL ASSOCIATION OF CONSERVATION COMMISSIONERS.

The State Forester was elected secretary of this association at its meeting in Washington, D. C., in 1913, and the annual meeting this year was held at New Orleans, La., at the invitation of the State Conservation Commission of Louisiana. The meetings were held at the St. Charles Hotel, New Orleans, from Monday, November 16, to Thursday, November 19, after which the Louisiana Conservation Commission extended invitation to the delegates for a trip to the mouth of the Mississippi River, where an exceptional opportunity was offered to see and study wild life and the fish and oyster industries of the section.

The subject, "Forests as Nurseries of Wild Life," was the topic on the program discussed by the author. The subject of wild life, and the importance of national and State laws regulating the same, particularly in the case of migratory birds, was given due consideration.

THE MASSACHUSETTS STATE FOREST POLICY.

Each year has seen a gradual step forward in our forestry work in Massachusetts, until sufficient fundamental legislation has accumulated so that it is not boasting, it is believed, to say that we now have in this State a well-rounded-out forest policy. It was with the idea of calling attention to this fact that the State Forester prepared and delivered the following

paper before the Society for the Promotion of Agricultural Science, which held its annual meeting at Washington, D. C., on Nov. 10, 1914, a copy of which is as follows:—

THE MASSACHUSETTS STATE FORESTRY WORK.

It is believed that we are still woefully lacking in the United States in being unable to show more results from the practice of modern forestry. In analyzing the situation it cannot be attributed to lack of enthusiasm and willingness on the part of the men in the profession. For some reason the owners of the larger tracts of forest lands seem interested, but nonactive, and real operating lumbermen change their methods relatively slowly. Public, national and State undertakings in forestry, from the standpoint of constructive and businesslike methods, seem to be lacking in vigor. Lack of funds to do with would appear to be the trouble; but why should this be, if the investment will warrant the expenditure? I believe the greatest weakness in forestry at present is the lack of stalwart men able to convince our Legislatures, business corporations and men of affairs of the great importance of doing something on a much larger and more comprehensive scale than we have yet accomplished. Planting a thousand or two trees, or thinning and practicing modern forestry methods on a 5-acre tract here and there, are but drops in the bucket as compared to what ought to be undertaken in forestry in our various States and throughout the nation. Had we attempted to dig the Panama Canal under the same momentum that we are practicing forestry to-day, it is questionable if it would ever have been completed; we, however, are allowing our lands adapted for splendid forest crops to lie idle, and worse than that, not even forest fires are kept under control.

Up to the present time most American foresters have looked wise, given a great deal of advice, written pamphlets and books, and kept up a very good propaganda of forestry interest, but we have still, it is believed, a great lack of results that will come only when the fundamental problems have been given deeper root.

In calling attention to the work in forestry in Massachusetts I preface my remarks thus because it has not been a question of object lessons, examples and demonstrations to follow, but a working out of our State system by our own efforts.

Before the States began to have foresters, the United States Forest Service offered advice and assistance throughout the nation. During this time many examinations and recommendations by experts were made for Massachusetts people, but strange to say, when these same documents were checked up for results later it was found very little had been accomplished. The work on behalf of the forest service was well executed, and the owners were evidently interested in the beginning, but the work failed to be carried out simply because it was not followed up and kept alive by further personal contact. One thing has been conclusive thus far in our experience in Massachusetts, and that is, if anything tangible

is to result in forestry work it must first be demonstrated by technical men right in the State; then our farmers and lumbermen will know we are advocating what can be accomplished from actual experience. The more real and definite examples a State forester can have scattered about his State, the sooner will he be able to make headway toward bettering general forestry conditions. Object lessons not only educate, but encourage action.

During the past eight years, year by year, through kindly consideration and definite legislation, the members of our General Court, enthusiastically headed by our public-spirited Governors, have given us statute after statute, until I am pleased to say I believe we now have a thoroughly well-rounded-out Massachusetts State forest policy. I am frank to say that I know of no State in the Union wherein the individual who cares to practice modern forestry can get more co-operation on the part of the State than in Massachusetts. While it is not the State's policy to actually give anything away, we nevertheless are so solicitous over ultimate success that we are doing everything possible to encourage our people to practice modern forestry.

I do not care to weary you by citing all of our various laws which are the foundations of our State forest policy, as they can be had in their printed form, but I do wish to point out briefly what is being done for forestry in Massachusetts.

- (1) Expert forestry services are given at no expense, except travel and subsistence, to anybody in Massachusetts. Blank forms for requesting such assistance are available from the State Forester's office, Boston.
- (2) In addition to expert advice, the State Forester's office has published, for free distribution, bulletins on the subjects of chief interest, as follows:—

Forest Thinnings.
Reforestation and Nursery Work.
Mensuration of White Pine.
Forest Fire Control and Management.
The Chestnut Blight Disease.
What is Forestry.
How and when to collect White Pine Seed.
Forest Taxation, etc.

- (3) Organization. The State Forester has general supervision. He is given trained assistants in the various branches represented in State work. The assistant in forest-fire work is given the title of State Fire Warden. Each town and city in the State has an officer known as forest warden. This officer is appointed by the officials of the town or city, and his appointment is subject to the approval of the State Forester. The local forest warden is clothed with enough power to get results in his jurisdiction. Some of his powers and duties are as follows:—
- (a) No warrants can be paid for fighting forest fires without his approval.
 - (b) May compel any citizen between the ages of eighteen and fifty-one

to assist in fighting forest fires, or may compel the use of teams and implements of another for similar use.

- (c) No fires are set out of doors from March to December without a permit from him.
- (d) The power to arrest without a warrant where persons are caught setting fires.
 - (e) Appoints his deputies.
 - (f) Has charge of local forest-fire apparatus.
 - (g) Pastes forest fire notices.
 - (h) Has responsibility of controlling brush and slash disposal.
- (i) Gives assistance to assessors when called upon to secure data for forest taxation.

The State is divided into four parts, and each of these divisions is looked after by a so-called district forest warden. This man is appointed by the State Fire Warden, and is supplied with a runabout auto. It is the duty of the district forest wardens to supervise the work of fire protection within their respective districts. They have charge of the observation stations within their districts, receive reports from the observers each week, and are at all times subject to the call of each observer to attend any disastrous fire. They shall visit all towns within their districts. instructing the town forest wardens and deputy forest wardens relative to their duties, making such recommendations as in their judgment will improve the service. They shall inspect all forest fire-fighting apparatus, seeing that the same is in perfect condition and in readiness for an immediate response to an alarm of fire. They shall visit the selectmen of the different towns, advising them as to the necessity of properly providing their towns with forest fire-fighting apparatus. They shall report the number of each locomotive operating in their district not properly equipped with spark arrester, as required by law, and whose ash pan and grate are not sufficiently protected from setting fires. They shall submit to this office a weekly report showing the work accomplished by them each day, and shall report to this office any inefficiency or neglect of any observation man, forest warden or deputy.

The surface of the State of Massachusetts is of a rolling nature and particularly well adapted for fire lookout stations, by utilizing its higher hills and mountains. During the past three years 26 of these stations have been in operation throughout the State. At first improvised towers were used, but now substantial ones of steel construction ranging in size from 40 feet high, which is the standard, to 75 feet. The accompanying map indicates their distribution over the State.

The position of observer on the lookout station is the most important position under our present forest fire system. The future preservation of the forests of the State of Massachusetts depends largely on the men in charge of these stations. If they are alive to the situation, and appreciate the importance of the position they hold, disastrous fires within this State will be eliminated.

Each observer has under his supervision over 400,000 acres of land, a

large percentage of which is valuable forest land. He is equipped with a field glass and the best map that can be obtained, and has the names and telephone numbers of every town forest warden and deputy forest warden within his territory. There has also been placed in each station a time-clock, to be punched every half hour, showing the exact time the observer is at his station, and the daily slips are to be forwarded, with the weekly report, to the State Fire Warden at the end of each week. The clock system affords a protection not only to the State, but to the man in charge of the observation station as well. Each observation man is directly under the supervision of the district forest warden, and shall forward him a copy of his weekly report. He must become thoroughly familiar with the territory under his supervision, studying the map and country carefully, becoming familiar with the names of the different mountains, hills, streams, ponds, roads, trails, railroads and trolley lines. He should know the local names which prevail in the region, the settlements where help may be collected quickly in case of fire, and the telephone connections in all directions from the station. All such information will assist in getting help to a fire as soon as smoke arises.

The weekly report has printed instructions on the back. This report is to be filled out each day, regardless of whether any fires are observed or not. If there are no fires, one line should be used each day, showing weather conditions, wind, etc. All fires observed must be reported. The observer must be very particular about the location of a fire, time observed, who notified, time of notification and time extinguished. He should keep his telephone in working order, calling up the central office each morning and after storms, to determine whether or not the line is in working order. If it fails to work he should go over the line and try to find breaks, and get it in working condition as promptly as possible. He should not open, disconnect or interfere with the telephone instrument in any way until he is absolutely satisfied that the line is not in perfect order. If it becomes necessary to examine the instrument, unless he is perfectly familiar with the construction and repair of the telephone he should not interfere with it in any way, but get a competent telephone man to make the necessary repairs. In case of inattention of any of the town forest wardens or their deputies he should notify the district forest warden and the State Forester's office.

- (4) Forestry Conventions. In order to enable the various officials to keep in close touch with the forest wardens throughout the State, and also to enable neighboring groups of wardens to discuss methods, equipment, etc., the State Forester is allowed to spend not exceeding \$2,000 for conventions during a year. While forest fires, their control and management form a very important part of the program, such subjects as reforestation, thinning and general forestry improvement practices are discussed.
- (5) State Aid for Forest-Fire Equipment. Massachusetts expects its towns with a valuation of over \$1,750,000 to be able to support its own forest-fire equipment, but all towns having a valuation below this amount

the State agrees to reimburse for 50 per cent. of an expenditure not to exceed \$500. This has encouraged our poorer towns to greater protection. The forest-fire lookout stations have been built usually on the cooperative plan, the towns covered paying one-half and the State the remainder.

- (6) Utilization. No more important part of forestry needs attention than does that of finding the best use for all products. Massachusetts was the first State to publish a bulletin on "Forest Utilization." This was done in co-operation with the United States Forest Service. We are at present continuing these studies, and have some very promising experiments being carried on.
- (7) Brush and Slash.—One of the great causes for the larger forest fires, and hence those of greatest damage, has come from fire getting into old slashings or brush left from operating lots. A law was enacted last year, taking effect Jan. 1, 1915, making it compulsory for every one operating a tract of forest land to leave a 40-foot strip free of slash or brush, as a natural fire prevention line, along the highways, railroad locations and all abutters' lands where there is danger from fire.
- (8) Railroad Fires and Railroads.—A State law compels all railroad engines to carry spark arresters, and by an order from the Public Service Commission all engines running in Massachusetts are subject to examination by agents deputized for this work. The commission has a special man in charge of this inspection, and the State Fire Warden also permanently assigns one of his deputies to overcoming railroad fires. They are experts on the inspection of spark arresters, ash pans, grates, etc.

The signal for all forest fires is a whistle of one long and three short blasts, and all engineers are required by law to comply with it.

By a Massachusetts law all expenses a town or city may have incurred in extinguishing railroad fires are reimbursed by the railroads responsible. This is in addition to the property damages themselves.

Since these enactments far better co-operation has resulted, and rail-road fires are rapidly diminishing.

- At our forest warden conventions the railroads are always represented.
- (9) Forest Taxation. Few subjects have received more agitation in Massachusetts than this one. An amendment of the State Constitution a process of several years was found necessary, followed by confirmation on the part of the people. Last year, however, the recommendations of a special forest taxation commission were adopted. At present, therefore, we have a modern system of taxing forest lands. Briefly, there is an annual tax upon the land at cut-over valuation, and then a so-called products tax is assessed when the products are harvested. This law safeguards any one who desires to invest in forestry from being imposed upon, and, as well, expects from the owner recognized methods of culture.
- (10) Reforestation Assistance to Owners.—A Massachusetts law is in force whereby any one having a tract of forest land adapted to reforestation may, by turning the title over to the State Forester, temporarily have it reforested for him at cost. The tract is then supervised by the State Forester until the owner cares to redeem the same. The period for re-

demption is ten years, and thereafter it becomes the property of the State. This law has been very popular, and has enabled the State Forester to start forestry work in many sections where individuals would not have the time or feel experienced enough to undertake the work. As the law contemplated scattering the work over the State as demonstrations and object lessons, the tracts thus planted range from 10 to 80 acres. The State in some instances has bought tracts for such use, but in this case the law restricts the acreage in any one year to 80 acres. When land has been thus handled for the individual, and has been redeemed, the owner is required to thereafter handle the plantation according to modern forestry methods.

In doing this work the State Forester of course is anxious to demonstrate and satisfy the owner that the work is economically and properly done. This encourages others to do similar work who do not care to turn the title over to the State. Either method is getting results, and that is the goal in view.

- (11) Causes and Numbers of Forest Fires. Each season we have secured more definite data as to causes of fires, and through a better checking up system practically all fires are now reported to the State Fire Warden. Blank forms are filled out by the forest warden after each fire, and mailed to the State Forester's office. With the causes of forest fires well understood it is less difficult to study out ways and means of obviating them.
- (12) State Forests. Our recent Legislature enacted a law empowering the Governor to appoint two State Forest Commissioners who, with the State Forester, are to purchase lands for State forests. The sum of \$90,000 was appropriated for this purpose. The commission is restricted in the purchase price of the proposed forests. They are not allowed to pay over \$5 an acre on the average. The policy of the State is to establish these proposed forests on lands now unproductive and likely to remain so, did the State not step in and reclaim them for forestry. Already the commission has gone over the State quite thoroughly, and many prospective tracts are in view. These tracts will give the State Forester an opportunity to demonstrate forestry on a more pretentious scale.
- (13) State Forest Nurseries. The State of Massachusetts grows its own small trees. A nursery of 7 acres is established on the farm of the Massachusetts Agricultural College at Amherst, and another of 4 acres is located at Barnstable on the Cape. Last year our inventory showed 7,000,000 trees, and our seed beds are increased in numbers this season.

A nursery has been started at the Massachusetts State Farm at Bridgewater, and this will be enlarged upon for transplant stock next season. With the advent of State-owned forests we will need a large output of young stock.

(14) Lectures and Exhibitions. — The State Forester and his assistants are called upon for talks and lectures by many organizations, colleges, schools, boards of trade, etc., and it has been through this medium that many people have become interested in forestry. The State Forester alone gave fifty-four talks and lectures one season. This season the

department has a new feature in demonstrating its work by moving pictures. Numerous exhibits are made of the State work each year at various fairs, food shows, sportsmen's shows, etc. A State Forester's exhibit is being prepared at the present time for the Panama-Pacific Exposition at San Francisco next year.

(15) Other regulations worthy of mention are: —

- (a) Power of the Governor to issue a proclamation closing the open season for hunting in dry times. This action was taken in the State this fall for the first time in many years.
- (b) Boy scouts are voluntarily becoming our best forest-fire fighters. Co-operative encouragement here brings remarkable results.
- (c) Fish and game deputies have the same authority in many respects as forest wardens. They are required to report all fires to the forest wardens.
- (d) The rural mail carriers who penetrate practically every forest section of the State are required to report all forest fires to the forest wardens in their territory. Three hundred carriers throughout the State, traveling a total mileage of 6,000 miles each day, are of great assistance in getting help to extinguish fires in their incipiency.

In conclusion, I trust I have at least given you a general idea of what the Massachusetts State forestry work is. Much more might be pointed out, as, for example, the great undertaking in the suppression of the gypsy and the brown-tail moths, which Massachusetts is doing at great expense, but which has already been discussed by the writer before this association.

The most important point I wish to make is that the forestry work in Massachusetts has progressed, and now that enough laws and general regulations are at hand for encouragement in forestry it is believed we shall from now on see more rapid development along modern forestry lines.

LECTURES AND ADDRESSES.

The unabated interest felt by the citizens generally throughout the State in forestry matters is evidenced by the continual demands made upon the department by public-spirited organizations for lectures on the subject. While it was impossible to accept all the invitations received, speakers were sent to the following meetings:—

Brockton and Abington Boards of Trade.

Massachusetts State Board of Agriculture.

New England Forest Fire Conference. Young Men's Catholic Union, Brookline.

Brotherhood of Hope Church, Spring-field.

Farmers' Club of Leominster. Men's Club, Newton Highlands. Malden Natural History Club.

Oakham Farmers' Club.

Berkshire Meeting, Forest Wardens, Pittsfield.

Springfield Meeting, Forest Wardens. Rural Progress Meeting.



Dinner hour in the lumber camp, Stevens estate, North Andover.



Improvement thinning in a mixed stand of chestnut and pine, where the chestnut was affected with blight. The pine is left standing to reseed the land.



Worcester Meeting, Forest Wardens. Fitchburg Meeting, Forest Wardens. Greenfield Meeting, Forest Wardens. Farmers' Week, Massachusetts Agricultural College.

South Bristol Farmers' Club.

Short Courses, Massachusetts Agricultural College.

Haverhill Meeting, Forest Wardens.

Boston Meeting, Forest Wardens.

Middleborough Meeting, Forest Wardens.

Marlborough High School.

Massachusetts State Firemen's Association.

Cornell University — Forestry Dedica-

Marshfield Farmers' Club.

Old Colony Pomona, Bridgewater. Middleborough Farmers' Meeting.

Quaboag Pomona Grange, West Brookfield.

Cape Cod Cranberry Growers' Association.

New Hampshire State Board of Trade. Oxford Pomona Grange.

Harvard Single Tax Colony.

Wakefield Grange.

Newton Forestry Meeting.

West Roxbury Women's Club.

Massachusetts State Grange.

Worcester Board of Trade.

Winchendon Public Forestry Meeting.

Williams College Forestry Talks.

The Cottages Association, Cotuit, Mass.

Colony Club, Sagamore Beach.

State Grange Meeting, Southwick.

State Grange Meeting, East Long-meadow.

State Grange Meeting, Greenwich.

Winter Hill Improvement Association.

West Medway Grange.

Bridgewater Grange.

New England Florists' Association,

Horticultural Hall.

Fitchburg Women's Club.

Holden Improvement Society.

The Princeton Grange.

Franklin Farmers' Club.

State Board of Trade.

Old Colony Pomona Grange.

Field Day at Lincoln.

Westminster Grange.

FIELD MEETINGS OF THE STATE GRANGE.

It may be said without fear of exaggeration that the people of Massachusetts come nearer to applying the intensive method to their industrial and agricultural interests than any other section. This spirit in enterprise and progress is demonstrated in many ways, but in none with more marked effect than by the work of the Patrons of Husbandry. The organized efficiency of the grange is well known and is of a high order, and is made possible by the unselfish personal service given to its endeavors by both the officers and members. A fact which is more and more apparent as the years go by is that as an organization it has become a powerful factor in accomplishing those ends calculated to promote to the fullest extent the social and industrial life of the community.

It has been the custom of the State Grange during the past few years to hold summer field meetings in various sections of the State. These meetings have been very popular with the members of the order and have been largely attended. At each meeting speakers have been provided to discuss matters relating to the welfare of the Commonwealth. The summer field meetings for 1914 were as follows:—

Middlesex Essex Pomona, Wilmington, Silver Lake.

Cape Cod Pomona, Cotuit.

Chebacco Pomona, Gloucester, Riverdale Park.

Worcester Central Pomona, Worcester, Green Hill Park.

Berkshire County, Pittsfield, with J. H. Noble.

Western Hampden Pomona, Southwick, with F. D. Lambson.

Worcester East Pomona.

Middlesex Worcester Pomona, Ayer, Ayer Park.

Middlesex North Pomona, Tyngsborough.

Worcester Norfolk Pomona, Mendon.

Hampshire Pomona, Amherst.

Springfield Pomona, East Longmeadow. Swift River, Greenwich Plains. Old Colony Pomona, Bridgewater. Essex County Pomona, Canobie Lake.

Boro Pomona, Westborough.

Worcester West Pomona, Winchendon, Lake Dennison.

Connecticut Valley Pomona, Greenfield, Shattuck Park.

Mayflower Pomona, North Hanson.

Middlesex Norfolk, Cochituate.

Quaboag Pomona, West Brookfield. Worcester Southwest, Sturbridge.

Norfolk Pomona, Norwood.

Deerfield Valley Pomona, Colrain.

Hillside Pomona, Cummington.
Berkshire South, Lake Buell, Sumner's
Landing.

Worcester Franklin, Brookside Park (Athol and Orange).

Middlesex Central Pomona.

The State Forestry Department was represented at many of these meetings by State Forester F. W. Rane, or the secretary, Mr. C. O. Bailey, at all of which meetings an enthusiastic interest was shown in the work of the department as described by the speakers.

WORK ON STATE HIGHWAYS.

The usual custom of this department having supervision of the insect work along the State highways throughout the moth-infested district, has been carried out again this year.

Work was done in the following cities and towns on the State highways, and paid for by the Highway Commission:—

LIST OF HIGHWAY WORK, 1914.

Abington,		\$20 34	Attleborough,		\$16 8	5(
Acton, .		156 63	Auburn, .		27 8	58
Amesbury,		114 51	Ayer, .		33 ′	76
Amherst, .		41 63	Barnstable,		358 (00
Andover, .		87 33	Barre, .		58 (00
Ashburnham,		73 75	Bedford, .		89 4	4
Ashby, .		 53 50	Bellingham,		12 '	70
Ashland, .		32 58	Beverly, .		290 3	7
Athol, .		34 40	Billerica, .		69	2

LIST OF HIGHWAY WORK, 1914—Continued.

Bourne, .				\$157 06	Marshfield, .			\$42 86
Boxborough,				128 65	Mashpee,			5 50
Braintree,				22 38	Melrose,			33 00
Brewster, .		·		36 00	Merrimac, .			41 97
Bridgewater,			·	26 57				85 35
Brookfield,			·	76 95				13 44
Burlington,	·			99 75	Middleton, .	•	•	14 75
Canton.				11 70	Montague, .	i		20 05
Chatham, .	·	•		18 25	Natick,		•	59 41
Chelmsford.	•			105 10	Needham, .	•		38 36
Chester, .				112 88	Newbury, .			88 53
Cohasset, .		•	•	40 41	Newburyport, .			38 00
Concord, .	·			231 04	North Andover,	•		177 45
Deerfield, .				12 25	North Attleborough,	•		58 05
Dennis, .	i			18 00	North Reading,	•	•	54 50
-		•		40 65	Northborough, .			105 00
Dover, . Dracut, .		٠	•	68 40	Northbridge			19 83
Duxbury, .		•		30 94	Northbridge, . Northfield, .	•	•	72 50
_	•	•				•	•	
Essex,		٠		27 51		٠		40 67
Falmouth, Fitchburg.		•	٠	121 80	Orleans,	٠		35 60 44 19
	•	٠	٠	65 76	Palmer,			
Foxborough,		•	٠	94 93	Pembroke, .		•	5 11
Framingham,		٠	٠	104 40	Pepperell,	•	•	68 47
Franklin, .	•	٠	٠	37 50	Pittsfield,			64 00
Gardner, .		•	•	13 20	Plainville,			25 15
Gloucester,		٠	٠	21 00	Princeton, .			14 00
Grafton, .		•		83 75	Quincy,			29 97
Greenfield,				27 00	Reading, .			120 25
Groton, .				37 29	Rehoboth, .			47 20
Groveland,				59 26	Rockland, .			29 69
Hadley, .			٠	71 38	Rockport, .	٠		13 00
Hamilton,				106 33	Rowley,	•		101 17
Hardwick,				28 84	Russell,			61 45
Harvard, .				46 81	Salisbury, .			95 88
Harwich, .				4 50	Sandwich, .			38 00
Haverhill,				132 45	Scituate,			150 20
Hingham,				27 63	Seekonk,			50 00
Holbrook,				14 00	Shrewsbury, .			117 80
Holliston, .				63 02	Somerset,			150 00
Hudson, .				44 46	South Hadley, .			77 00
Huntington,				104 56	Southborough, .			60 96
Ipswich, .				44 50	Spencer,			21 05
Lakeville, .				9 75	Sterling,			100 50
Lancaster,				55 10	Stoneham, .			88 30
Leicester, .				29 00	Stoughton, .			21 25
Leominster,				64 00	Sudbury,			219 30
Lexington,				94 45	Sutton,			12 31
Lincoln, .				65 35	Swampscott			4 00
Littleton, .				72 80	Swansea,			126 25
Lowell, .				42 68	Taunton,			23 75
Lunenburg,		·		71 40	Templeton,			73 30
Marion, .				18 00	Tewksbury, .			78 39
Marlborough,				228 65	Townsend, .			125 00

LIST OF HIGHWAY WORK, 1914—Concluded.

Truro,		\$10 50	Westford, .			\$184	00
Tyngsborough, .		169 08	Westminster,			19	35
Ware,		53 50	Weston, .			96	00
Warren,		44 54	Westwood,			12	25
Wayland,		102 83	Weymouth,			130	50
Wellfleet,		44 50	Whitman,			19	95
Wenham,		94 25	Wilmington,			66	74
West Boylston, .		51 11	Winchester,			67	25
West Bridgewater,		28 11	Woburn, .			206	19
West Brookfield,		44 54	Worcester,			29	54
West Newbury,		115 62	Yarmouth,			47	20
Westborough, .		39 27			-		
Westfield, .		118 85			9	310,038	12

PARASITE WORK.

Report of Mr. A. F. Burgess, in Charge of Moth Work, Parasite Laboratory, Melrose Highlands, Mass.

JAN. 12, 1915.

Dear Professor Rane: — Dr. L. O. Howard, chief of the Bureau of Entomology, has requested me to prepare a brief report on the parasite work for the year 1914. The information enclosed relates particularly to conditions in Massachusetts, and is of especial interest to the citizens of this State.

Very truly yours,

A. F. Burgess, In Charge of Moth Work.

The plan for conducting the parasite work of the gypsy and browntail moth has been to collect and rear the most important natural enemies of these insects, and colonize them in territory remote from where the parasites had already spread. This was done in order to enable the beneficial species to become established over the entire infested territory as rapidly as possible. In order to secure further information in regard to the work of the parasites of the gypsy moth in Europe, Dr. John N. Summers, one of the assistants in the Bureau at the Gypsy Moth Laboratory, visited Germany during the spring and summer of 1914.

Unfortunately, severe gypsy-moth outbreaks did not exist in Germany this year, so that he was not able to obtain as much information as was anticipated. He visited, however, a number of large forests in Hungary where the gypsy moth was present in large numbers, and secured some data concerning the habits of this insect in its native home. Owing to the fact that he did not receive information in regard to the presence of this gypsy-moth outbreak until late in the season, it was impossible to secure parasites for shipment to this country. No parasites have been imported during the present year.

During the spring of 1914, 1,500,000 specimens of Anastatus bifasciatus were colonized. Most of these were liberated in towns in northern Massachusetts, but a few towns in New Hampshire were also supplied. An examination of egg clusters from some of the colonies of this species which were liberated several years ago showed that the parasitism is sometimes as high as 43 per cent., and very commonly 25 per cent. of the eggs in a cluster are destroyed by this insect.

In the fall of 1914 collections in the field enabled us to rear at the laboratory large numbers of *Schedius kuvanae*, and over 2,000,000 specimens of this species have been colonized in 111 towns, 60 of which are located in Massachusetts. The colonization work in Massachusetts was begun in the Cape district, and extended in a crescent form to the New Hampshire line, plantings having been made in practically all the known woodland colonies of the gypsy moth in southern Massachusetts.

During the summer Compsilura concinnata, one of the species of Tachinid flies which has become most firmly established in this country, was found in many localities throughout the area infested by the gypsy moth. This species seems to occur locally, and it is sometimes present in large numbers in small and scattered moth infestations. One generation of this parasite usually develops on the caterpillars of the brown-tail moth in the early spring, and as the latter species was locally rather than generally common throughout the infested area last spring, this may, in part, account for the local rather than general distribution of Compsilura.

Apanteles lacteicolor, a parasite of both the small gypsy and brown-tail moth caterpillars, was not as abundant as usual this season. The larvæ of this species hibernate within the small brown-tail caterpillars in the webs during the winter, and as there was a heavy mortality of the brown-tail caterpillars during the winter of 1913–14, the number of Apanteles was seriously reduced.

Several other introduced parasitic species have been found in small numbers, but not common enough to cause any appreciable benefit. Another species of Apanteles, Apanteles melanoscelus, was found in satisfactory numbers in Melrose and vicinity. Only one colony has been liberated in this country, and this was the last species which was imported. It has survived two New England winters and gives promise of being a very satisfactory enemy of the gypsy moth. Several years, however, will be required for the insect to become abundant enough to spread over the infested area.

The Calosoma beetle, Calosoma sycophanta, was more abundant and was found over a larger area than in any previous year. A number of colonies were liberated in remote parts of the infested area. The work of this insect is very striking, and enormous numbers of the gypsy and brown-tail moth are destroyed by this species.

The summer of 1914 was unusually mild, particularly during June and early July. During this period the gypsy-moth caterpillars flourished and their numbers were not reduced to any great extent by the "wilt" disease until the caterpillars were nearly full grown. During the past two years

the parasites and the "wilt" disease have made enormous inroads on the gypsy-moth larvæ during June and early July, but less reduction of the caterpillars took place this year over the entire infested area as a whole.

In many localities the gypsy-moth infestation has decreased materially, as a result of the work of natural enemies, but in some of the older infested territory, particularly south of Boston and on Cape Cod, a marked increase in infestation has been observed.

It is believed that a reduction will be made by natural enemies during the coming year, but the problem is very complex, and with our present knowledge it is impossible to state definitely what will happen next summer. Doubtless there will be seasons when an unexpected increase of the moth will take place, but the general trend for the past few years has indicated that the natural enemies are bringing about greatly improved conditions.

NEW LEGISLATION.

The Legislature of 1914 is fairly entitled to the credit of having enacted more important legislation calculated to advance the forestry interests of the Commonwealth than has been done in any previous year.

Forest Taxation.

Much has been said during the past few years with regard to the importance and desirability of a law which would change the unsatisfactory method of taxing wild and forest lands which has been in vogue in this State from time immemorial. The insistent demand of those interested in the subject culminated in the passage by the last Legislature of an act entitled, "An Act to provide for the classification and taxation of wild or forest lands." This bill was prepared by a commission appointed by the Governor for that special purpose. While the act is too long to be published in this report, the State Forester has recently issued a booklet containing a full text of the law with explanatory notes, which will be mailed to any one on request.

Slash Law.

Another law, which if properly enforced cannot fail to be of great benefit in reducing the forest fire evil, is the so-called slash law, which is printed under the head of the State Fire Warden's report.

Injurious Insects.

The State Forester desires also to call attention to an act passed enabling cities and towns to suppress the tent caterpillar, leopard moth and elm beetle. This act was passed upon the petition of prominent town and city officials of the metropolitan district, and reads as follows:—

ACTS OF 1914, CHAPTER 404.

An Act to authorize cities and towns to suppress the tent cater-PILLAR, LEOPARD MOTH AND ELM BEETLE.

Be it enacted, etc., as follows:

Section 1. The city forester, superintendent or other persons having charge of the suppression of gypsy and brown tail moths in each city and town in the commonwealth, or, where there is no such person, the tree warden, may destroy within the limits of his city or town the tent caterpillar, leopard moth and elm beetle, if authorized so to do by the mayor and city council or commission in cities, or by the selectmen in towns.

SECTION 2. For the purposes of this act the city forester or other officer designated in section one of this act may enter upon private land, and the owners of private land may be taxed for work done under the provisions of section one of this act in the manner provided by sections six and seven of chapter three hundred and eighty-one of the acts of the year nineteen hundred and five and acts in amendment thereof and in addition thereto: provided, however, that nothing contained in this act shall require the commonwealth to pay any part of any such expense, other than for the suppression of the gypsy and brown tail moths, that no land shall be assessed under the provisions of this act which has been assessed the maximum amount provided by said sections six and seven and amendments thereof for the suppression of the gypsy and brown tail moths, and that the aggregate assessment on any parcel of private land for the suppression of the tent caterpillar, leopard moth, elm beetle and gypsy and brown tail moths shall not exceed the maximum provided by said sections six and seven and the amendments thereof.

Section 3. This act shall take effect upon its passage. [Approved April 23, 1914.

State Forest Commission.

Chapter 131, Acts of 1913, creating a Forest Tax Commission, authorized said commission, in addition to a study of the tax problem, to "investigate the present policy of the commonwealth with regard to the acquisition and management of wild or forest lands and report what further legislation, if any, is necessary." In its report to the Legislature of 1914, the

commission recommended the creation of a commission to acquire suitable lands for State forests. In accordance with the commission's recommendation, the following bill was enacted:—

ACTS OF 1914, CHAPTER 720.

 ${
m A_{N}}$ ${
m A_{CT}}$ to establish a state forest commission and to provide for the purchase of lands for state forests.

Be it enacted, etc., as follows:

Section 1. There is hereby established a state forest commission, to be composed of three persons, one of whom shall be the state forester and two other members who shall be appointed by the governor, with the advice and consent of the council, and who shall serve without compensation. The term of office of the appointive members of the commission shall be six years, except that when first appointed one of the members shall be appointed for six years and one for three years. Thereafter one member shall be appointed every third year.

Section 2. The commission shall have power to acquire for the commonwealth by purchase or otherwise, and to hold, woodland or land suitable for timber cultivation within the commonwealth. The commission may, after a public hearing, sell or exchange any land thus acquired which in the judgment of the commission can no longer be used advantageously for the purposes of this act. The average cost of land purchased by the Commission shall not exceed five dollars an acre.

Section 3. Lands acquired under the provisions of this act shall be known as state forests and shall be under the control and management of the state forester. He shall proceed to re-forest and develop such lands and shall have power to make all reasonable regulations which in his opinion will tend to increase the public enjoyment and benefit therefrom and to protect and conserve the water supplies of the commonwealth. The state forester shall keep and shall publish in his annual report an account of all money invested in each state forest and of the annual income and expense thereof.

Section 4. In the reforestation, maintenance, and development of lands purchased under this act, the state forester, so far as it is practicable, shall obtain the labor necessary therefor under the provisions of chapter six hundred and thirty-three of the acts of the year nineteen hundred and thirteen, and acts in amendment thereof and in addition thereto.

Section 5. Land acquired under the provisions of this act shall be exempt from taxation; but the commonwealth shall reimburse cities and towns in which such lands are situated for taxes lost by reason of their acquisition, in the same manner and to the same extent as in the case of lands acquired for public institutions under the provisions of chapter six hundred and seven of the acts of the year nineteen hundred and ten.

Section 6. The sum of ten thousand dollars may be expended during the present year and the sum of twenty thousand dollars may be expended annually for the four succeeding years by the state forest commission in the Appropriation for 1014

\$20,000,00

acquisition of lands under the provisions of this act: provided, that the said commission may, at its discretion, authorize the state forester to expend a part of said sum in the maintenance of said lands. If any part of said twenty thousand dollars remains unexpended at the close of any year, the balance may be expended in the following year. The said commission may also expend not more than five hundred dollars annually for its necessary expenses incurred in carrying out the provisions of this act.

Section 7. This act shall take effect upon its passage. [Approved June 29, 1914.

FINANCIAL STATEMENTS.

General Forestry.

In accordance with section 6, chapter 409 of the Acts of 1904, as amended by section 1, chapter 473 of the Acts of 1907, the following statement is given of the forestry expenditure for the year ending Nev. 30, 1914:—

State Forester's Expenses.

Appropriation for		4,	•			•				•	\$20,000	UU
Expenditures:	_											
Salaries of assista	ints,							\$6,1	188	82		
Traveling expens	es,			٠		۰		3,0	030	69		
Stationery and p	ostag	e, et	с.,					ę	327	87		
Printing, .									31	98		
Maps, photograp								2	297	80		
Equipment, tools	s, etc.	٠,						2	223	66		
Sundries, including								1	133	13		
Nursery accour	nt:-	_										
Pay roll, .								6,5	541	50		
Travel,									23	13		
Equipment, .								1,8	336	99		
Seeds and seedling	igs,				9			7	711	41		
Express and freig	ht,							Ę	583	78		
Sundries, .									69	13		
											19,999	89
Balance retu	rned	to t	reas	ury,						۰	\$0	11
	Purc	hase	and	l Plan	nting	of i	Forest	t Lan	ds.			
Appropriation for	r 191	4,						\$10.0	000	00		
Receipts: —		,						,				
Wm. D. Sohier,								1	120	00		
Davis Hardware												
		1 0			,					_	\$10,148	42
Amount carr	ied fo	orwa	rd,								\$10,148	42

Amount brought forward,						\$10,148 42
To a sur literance						
Expenditures: —					\$9,186 44	
Pay roll,		•	•	•	99 60	
Travel,	•	•	•	•	272 69	
Express, freight and teaming,	•	•	•	.*	247 47	
Telephone,		•	•	•	3 95	
w 1	•	•	•	•	330 00	
Land,	•	•	•	•	8 07	
Sunaries,	•	•	•	•		10,148 22
Balance returned to treas	ury,		٠			\$0 20
Preven	*** 0.m	of T	Tomost	F.	0.0	
		-		-		
Appropriation for 1914, Receipts: —	•	٠	•	٠	\$23,000 00	
New England Telephone and	Tele	gran	h Co	m-		
pany — rebate,					58	
Various towns for cans, broom					643 64	
Town of Falmouth,					350 00	
Town of Dartmouth,					150 00	
Town of Yarmouth,					100 00	
Town of Barnstable,					350 00	
City of Fall River,		1		Ċ	225 00	
	Ť	·		_		\$24,819 22
Expenditures:—						
					\$13,972 94	
Travel,					3,920 39	
Printing,					991 44	
Stationery and postage,					300 39	
Equipment,					1,390 21	
Construction,					3,203 52	
Telephone,					898 82	
Express, freight and teaming,					80 89	
Sundries,			4		59 60	
						24,818 20
D-1						
Balance returned to treas						\$1 02
Reimbursement for fire-fightin	gap	para	itus t	o to	wns,	\$2,127 05

Suppression of Gypsy and Brown-tail Moths.

The balance shown on the general appropriation for the suppression of the gypsy and brown-tail moths, as carried at the end of the fiscal year, will be practically expended in reimbursements to towns and cities for the work of the year ending Nov. 30, 1914.

General Appropriation.

Balance on hand, Nov. 30,	1913	, .				\$121,558	10
Less reimbursement paid for	r 19	13,				48,310	36
Balance for 1914 work,						\$73,247	74
Receipts: —							
Town of Braintree,		•	•	•	٠	220	
Town of Weymouth, .			•	•	٠	585	
· · · · · · · · · · · · · · · · · · ·			•		٠	1,361	
			•	•	٠	241	
					٠	404	
			•	•	٠	87	
9 /			٠		٠	39	
	•			•	٠	518	
Town of Dedham,						1,159	
Town of Lincoln,						79	20
Town of Wellesley, .						3	50
Town of Raynham, .						37	42
Town of Maynard,						79	29
Town of Ayer,						110	36
Town of Andover, .						204	68
Town of Ashland, .						613	80
Town of Rochester, .						29	35
Town of Easton,						12	50
Town of Topsfield, .						1,974	51
Town of Royalston, .						3	90
City of Medford,						1,040	94
Town of Milton,						2,391	15
Town of Hingham,						393	68
9 /						125,000	00
						1,172	
/D C W7 . L . C - L						829	
Dow Chemical Company,						15	26
m and							99
Amount carried forward	ł,					\$211,867	35

Amount brought forward,	\$211,867 35	
Town of Stoneham,	47 12	
Salem Cadet Association,	113 95	
Town of Natick,	44 53	
Town of Milton,	18 50	
Harbor and Land Commission,	82 01	
Prevention of forest fires,	295 80	
Fall River Water Works,	47 80	
Dover gypsy moth fund,	2,236 10	
State Forester's expenses,	40 84	
Special North Shore fund,	5,655 77	•
Appropriation for 1915,	75,000 00	
City of Quincy,	1,127 34	
Checks returned on Lexington and Princeton		
pay rolls,	7 00	
New York, New Haven & Hartford Railroad		
Company (for lost magneto),		
Balance on appropriation for exhibit at Food		
Fair,	16 01	
Town of Hopkinton,	,	
Use of outfit in thinning work,	101 50	## DOOM DOOL DIE
		\$297,901 97
Office expenses: —		
Salaries of clerks,	\$3,061 96	
Rent of offices,	2,409 96	
Stationery and postage,	1,661 53	
Printing,		
Office supplies,	281 25	
Sundries, including telephone, lights, express, etc.,		
etc.,	1,318 48	
D 11	44,493 86	
Travel,	9,228 01	
Supplies,	102,513 92	
Rent of supply store,	750 00	,
Store equipment,	207 90	
Special work,	0.000.00	
Reimbursement to towns and cities,	31,104 25	
Sundries, including freight, express, teaming,	01,101 20	
etc.,		
		209,027 34
Balance on hand Nov. 30, 1914,		\$88,874 63
Reimbursement paid December, 1914, and J	January, Feb-	
ruary and March, 1915, for the year 1914,		\$39,670 10

Si	oecial	North	Shore	Fund.
----	--------	-------	-------	-------

	1									
Balance from 1913,							\$9,999	76		
Receipts: —										
City of Beverly, .							3,500	00		
Town of Manchester,							3,500	00		
W. D. Sohier, agent,						1	7,000	00		
South End Improvem	ent 1	Asso	ciati	on o	f Ro	ck-				
port,							190	00		
Town of Rockport,							200	00		
F. W. Rane, State For	reste	er,		`.			7,000	00		
Appropriation for su	ppre	ssion	of	gyp	sy a	ind				
brown-tail moths,							3,448	83		
Town of Swampscott,							19	50		
F. W. Rane, State										
work),							200	00		
Dover gypsy moth fur							108	75		
									\$35,166	84
Expenditures: —										
Pay roll,							\$14,053	33		
Travel,							458	23		
Supplies,							10,443	72		
Rent,							296	20		
Stationery and postag							3	53		
Store equipment, .							8	60		
Sundries, including tea							1,572	53		
								—	26,836	14
Balance on hand	Nov	. 30,	1914	4,					\$8,330	70

Dover Gypsy Moth Fund.

A special fund was created in August, 1913, for woodland work in the town of Dover, the work to be done in a co-operative manner, similarly to that done on the North Shore. A statement of the income of the fund and expenditures under it is given here, from the beginning of the work to the end of the present fiscal year.

Receipts:—				
Town of Dover,			\$1,000	00
F. W. Rane, State Forester,	6		1,000	00
Town of Dover,			. 1,220	40
Amount carried forward,			\$3,220	40
Amount carried forward,			Φυ,440	TU

Amount brought forward,					\$3,220	40		
F. W. Rane, State Forester,					2,000	00		
Union Lumber Company, .					7	00		
Winthrop Harvey,					197	38		
R. E. Sherman,					. 93	80		
F. H. Diehl & Son,					1,133	96		
Richard Bragey,					2	40		
Appropriation for suppression	of	gyp	sy	and				
brown-tail moths,					4	84		
J. E. Lonergan & Co.,					3	00		
Town of Dover,					1,000	00		
F. W. Rane, State Forester,					1,000	00		
Poore & Chadwick,					7	92		
Simpson Bros. Corporation,					65	25		
Geo. M. Cushing,					29	00		
Winthrop A. Harvey,					97	76		
W. Rodman Fay,					149	24		
Robert K. Rogers,					8	80		
Tools lost,					2	00		
Norfolk Hunt Club,					125	00		
Richard Smalley,					13	50		
Robert Baker,					3	50		
Turner Bailey,				,	4	00		
C. F. Eddy & Co.,					66	00		
Geo. D. Hall,					57	67		
Town of Dover,				:	1,000	00		
							\$10,292	42
Erman dituma							Ψ10,232	12
Expenditures: —					@C 700	~ A		
Pay roll,	٠	•	•	•	\$6,788			
Travel,		•	٠		52			
Supplies,		٠	٠	•	2,358			
Sundries,		•	٠	•	31	13		
						—	9,230	60
						_		
Balance on hand Nov. 30,	191	4,					\$1,061	82

The following is a list of cities and towns, with amount of supplies for moth work furnished them, for the year ending Nov. 30, 1914. The amounts given are the gross amounts furnished, some of the cities and towns having made payments to the State Forester's office for all or a part of the amounts, according to the amount of their net expenditures or their



Logs in the boom at Connecticut River Lumber Company, Mount Tom Junction, Mass. These logs have come down the river from the mountains of Vermont and New Hampshire.



Connecticut River Lumber Company, Mount Tom Junction, Mass. The largest sawmill in the State.



class under the provisions of the law. For amounts received from this office in reimbursement and supplies see the table on page 97.

Third-class Towns.

A - 4			0007 07	34:11111		0000 47
Acton,			\$695 97	Middleborough,		. \$836 47
Ashburnham, .		٠	114 38	Middleton, .		. 226 83
Ashby,			46 05	Nantucket, .	•	. 40
Ashland,		•	100 55	Newbury, .		. 531 58
Auburn,			131 02	Norfolk,		. 111 96
Avon,			90 67	North Andover,		775 57
Ayer,		•	292 55	North Reading,		. 1,017 92
Bedford,			1,551 20	Northborough, *.		. 448 73
Berkley,			21 30	Norwell,		. 1,231 53
Berlin, 1			1,720 60	Pembroke, 1 .		. 1,920 17
Billerica,			814 96	Pepperell, .		. 571 79
Bolton, 1			2,060 31	Plainville, .		. 150 97
Boxborough, .			652 18	Plympton, .		. 284 34
Boxford,			490 58	Princeton, .		. 682 96
Boylston,			62 31	Raynham, .		. 47 45
Bridgewater, .			480 53	Rowley,		. 608 57
Burlington, .			503 01	Salisbury, 1 .		. 1,874 54
Carlisle,			625 50	Sandwich, .		. 156 93
Carver,			667 93	Scituate,		. 1,063 61
Chelmsford, .			1,185 21	Sherborn,		. 326 74
Deerfield,			3 76	Shirley,		. 405 15
Dracut			849 75	Shrewsbury, .		. 38 61
Dunstable, 1 .			1.188 65	Southborough, .		. 238 46
Duxbury,			202 35	Sterling,		426 59
East Bridgewater			1,930 39	Stoneham, .		675 69
Essex,	,		141 22	Stoughton, .		. 866 06
Georgetown, 1 .			1,909 44	Stow, 1		0.040.00
Groton,			754 94	Sudbury,		746 22
Groveland			163 23	Templeton, .		243 73
Halifax,		·	22 76	Tewksbury, .		. 1,018 45
Hamilton, .	·	·	774 01	Topsfield,		294 91
Hanover,			1.176 11	Townsend, .		552 84
Hanson			276 76	Tyngsborough, .	•	1,021 85
Harvard, 1			2,405 56	Wayland,		000 50
Holden	·		299 57	Wenham,		571 71
Holliston,	•		58	West Boylston, .	•	. 77
Hopkinton, .			60 89	West Bridgewater,	•	. 366 55
Hudson, 1.			1.976 21	West Newbury,	•	. 215 42
Ipswich,		•	957 38	West Newbury, Westborough, .	•	. 138 61
Kingston,			294 73			010 00
,		•		Westford,		. 912 82 . 130 62
Lincoln,			1,700 38	Westminster, .		E 00
Littleton,			697 82	Whately,	•	. 5 26 . 812 67
Lunenburg, .			676 75	Wilmington, .		
Lynnfield, .			567 44	Winchendon, .	٠	. 325 73
Marshfield, .			871 93			050 500 10
Mashpee,			253 03			\$58,728 12
Merrimac, .			216 59			

¹ Received sprayer from State, town or city paying one-half the cost.

First and Second Class Towns and Cities.

		 		 -			_
Andover, .		\$864 17	Milton, .			\$18	50
Barnstable,		456 98	Natick, .			92	15
Braintree,		7 99	Newton, .			4,789	55
Canton, 1 .		2,997 60	Quincy, .			1,133	92
Cohasset, .		1,990 67	Reading, .			1,850	11
Concord, .		785 41	Saugus, .			1,027	34
Danvers, 1		1,967 97	Wakefield,			827	18
Gloucester,		526 18	Waltham,			1,454	30
Hingham,		1,258 18	Weston, .			1,539	63
Lexington,		931 09	Weymouth,			1,873	06
Lowell, .		386 58	Woburn, .			867	21
Marlborough, 1		2,486 28	Worcester, 1			3,024	06
Medford, .		640 40			_		
Methuen, .		1,135 05			8	93,659	68

¹ Received sprayer from State, town or city paying one-half the cost.

Dover gypsy moth fund,									\$2,103	63
Fall River Water Works,									47	80
Forest fire prevention, .									585	09
Forestry,									141	72
Pine Banks Park, .					٠				95	60
Forest thinnings, .									286	16
Special North Shore fund,									5,647	41
Moth superintendents, etc.									197	62
Office,									3	19
Automobiles,									33	43
~ 1										10
Traveling sprayers.						·	•		886	
ziavonig opiayon,	•	•	•	•	•	•	•	•	000	00

Total amount disbursed through supply store, . . . \$103,692 29

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

The following table shows the reimbursement, amount of supplies furnished and net amount received from this office by cities and towns for 1913, the required expenditure before receiving reimbursement from the State, the total net expenditure, the amount received for work on private property returned to this office, the amount paid in reimbursement, gross amount of supplies, and total net amount received from this office by cities and towns for 1914, and also the required expenditure for 1915. In the last two columns is shown the number of spraying outfits, both large and small, owned by each town or city.

			1913.				19	1914.			1915.	SPRAYING OUTFITS IN TO AND CITIES.	SPRAYING OUTFITS IN TOWNS AND CITIES.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Abington,	89	1	1	1	\$1,403 51	1	1	1	1	1	\$1,459 85	1	[t 1
Acton,	69	\$550 00	1 \$2,148 73	\$2,098 73	975 90	81,779 79	\$275 00	\$803 89	\$695 97	\$1,499 86	970 01	1	1
Acushnet,	69	1	1	1	439 31	i	ī	1	ı	1	461 61	1	ŧ
Amesbury,	67	1	1	1	2,626 67	1	1	1	1	1	2,681 87	1	1
Andover,	67	1	2 911 31	706 63	3,234 59	3,194 35	1,921 54	1	2 864 17	659 14	3,437 11	က	5
Arlington,	-	1	2 1,172 67	1,158 32	2,000 00	5,456 62	1	1	1	1	2,000 00	2	က
Ashburnham,	co	431 03	209 75	640 78	500 72	88 946	411 96	476 16	114 38	590 54	510 84	ł	1
Ashby,	co	271 97	174 17	446 14	248 18	731 28	38 19	483 10	46 05	529 15	257 75	1	1
Ashland,		ı	1,564 72	950 9:	600 12	546 93	269 40	ı	2 100 55	47 36	583 64	1	1
Athol,	89	1	1	ı	2,342 62	ſ	ŧ	1	1	ı	2,603 15	1	1
Attleboro,	-	1	1	ı	2,000 00	1	1	1	1	1	2,000 00	1	1
Auburn,	60	1	1	ı	634 80	635 58	325 81	78	131 02	131 80	692 00	ı	ı
Avon,	က	175 20	47 80	223 00	431 88	692 94	88 90	261 06	29 06	351 73	446 40	1	1
Ayer,	63	1	11,804 80	1,204 80	927 85	3 1,017 57	340 05	116 68	292 55	409 23	928 05	1	1
Barnstable,	7	ı	1	1	3,370 26	3 418 25	1	1	4 481 14	1	3,503 85	2	ı
Barre,	83	1	1	ı	1,053 58	1	1	1	1	1	1,089 64	1	ı

3 Work financed by State.

1 Received sprayer from State, town paying one-half the cost, \$600.

² Town paid part of the amount for supplies.

4 Town paid full cost of supplies.

			1913.				19	1914.			1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	SPRAYING FFITS IN TOWN AND CITIES.
Cities and Towns.	Class.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Bedford,	က	\$1,393 63	1 \$3,057 36	\$3,850 99	\$716 31	\$2,158 11	\$1,122 01	\$1,441 80	\$1,551 20	\$2,993 00	\$743 59	2	1
Bellingham,	က	1	1	ı	382 26	1	1	1	1	1	401 72	ı	1
Belmont,	2	1	. 1	1	3,297 49	ı	ı	1	1	ı	3,530 53	1	63
Berkley,	က	68 28	43 80	112 08	208 21	263 46	65 68	55 25	21 30	76 55	225 43	ı	-
Berlin,	က	775 79	237 52	1,013 31	249 31	1,269 00	368 81	419 69	1 1,720 60	1,540 29	259 20		1
Beverly,	1	1	t	ı	5,000 00	1	ı	ı	1	1	2,000 00	1	1
Billerica,	က	75 41	603 61	679 02	1,385 80	1,723 64	880 38	337 84	814 96	1,152 80	2,211 97	1	63
Blackstone,	က	1	1	1	26 896	ı	1	1	1	1	981 31	1	1
Bolton,	eo	774 95	337 96	1,112 91	271 59	1,106 78	428 31	235 19	1 2,060 31	1,695 50	303 76	1	1
Boston,	-	9,849 89	ı	9,849 89	2,000 00	30,167 55	14,272 57	11,752 43	1	11,752 43	2,000 00	1	1
Bourne,	2	ı	ŧ	1	3,057 72	1	1	1	1	1	3,132 73	-	1
Boxborough,	က	1,348 50	584 29	1,932 79	117 39	1,241 02	221 30	1,123 63	652 18	1,775 81	115 27	1	1
Boxford,	က	1,405 33	429 81	1,835 14	614 49	1,816 05	507 13	1,201 56	490 58	1,692 14	643 07	1	2
Boylston,	က	527 13	118 28	645 31	212 02	2 669 04	460 11	457 02	62 31	519 33	217 96	1	-
Braintree,	5	1	1,3 2,355 76	1,535 76	3,495 80	1	1	ı	4 7 99	ľ	3,568 30	-	1
Brewster,	က	1	1	ı	325 23	3	ı	1	1	ı	345 60	ı	1
Bridgewater,	က	92 30	1 1,684 75	1,177 05	1,543 15	1,520 40	477 95	1	3 480 53	457 78	1,844 84	1	1
Brockton	-	1			000 000						0000		

5,000 - - - - - 5,000 316 41 1,812 46 242 75 1,496 05 503 01 1,999 06 399 5,000 00 - - - - - - - 5,000 2,543 23 4,293 07 1,434 11 440 34 12,997 60 2,478 42 2,715 196 790 28 1,800 46 775 30 1,010 18 667 93 1,678 11 838 518 93 - - - - - - - - 776 1,785 87 2,083 47 746 65 30.760 1,185 21 1,492 81 1,788<	5,000 5,000 1199 1199 11,785 5,000 6,000 1,785 1,785 1,785 1,785 1,785 1,785 1,785 1,785 1,785 1,785 1,790 1,7	1,037 80 2,020 54 800 00 772 83 2,549 92 460 29 623 71 246 92 74 55 638 82 74 55 131 85 2,447 58
41 1,812 46 242 75 1,496 05 503 01 1,999 06 90 -	316 5,000 199 1785 5,000 3,661 8,417 8,520	8
23 4.293 07 -	2,543 199 790 5,000 5,000 3,520 3,520	3, 1, 8
23 4,293 07 1,494 11 440 34 1,2,997 60 2,478 42 2 17 2,589 09 414 23 2,389 92 625 50 3,015 42 2 28 1,800 46 775 30 1,010 18 067 93 1,673 11 93 - - - - - 60 - - - - - 61 - - - - - 64 4,423 23 2,421 23 - 1,1990 67 1,597 45 4 65 3,313 44 1,410 23 - - - - - 60 - - - - - - 60 - - - - - 60 - - - - - 73 - - - - - 8 3,313 44 1,410 23 - - - - 8 - - - - - - 90 - - - - - - 10 - - - - - - 10 -	2,543 199 790 518 1,785 5,000 3,661 4,417 4,417	3,0 8 8 7 2,00
17 2,589 94 44 23 2,389 92 625 50 3,015 42 28 1,800 46 775 30 1,010 18 667 83 1,678 11 88 2,093 47 746 65 307 60 1,185 21 1,492 81 51 - - - - - - 8 3 60 4,423 23 2,421 23 - - - - 3 46 4,190 26 831 60 378 76 785 41 1,007 09 3 55 3,313 44 1,410 23 -	199 790 518 1,785 5,000 3,661 4,417 3,520	3,0,0
28 1,800 46 775 30 1,010 18 667 93 1,678 11 87 2,093 47 746 65 307 60 1,185 21 1,492 81 1 50 - - - - - - 8 60 4,423 23 2,421 23 - - - - - 3 76 4,190 26 831 60 378 76 785 41 1,007 09 3 73 - - - - - - - 65 3,313 44 1,410 23 - - - - - 2 73 - - - - - - - 2 2 60 - - - - - - - 2 2 73 - - - - - - - - - - - - - - - -	790 518 1,785 5,000 3,661 4,417 3,520	2,08
87 2,093 47 746 65 307 60 1,185 21 1,492 81 1 90 - - - - - 8 61 - - - - - 8 69 4,423 23 2,421 23 - 1,990 67 1,507 45 4 76 4,190 26 831 60 378 76 785 41 1,007 09 3 73 - - - - - - 60 - - - - - 73 - - - - - 73 - - - - - 8 - - - - - 10 - - - - - 10 - - - - - 10 - - - - - 10 - - - - - 10 - - - - - 10 - - - - - 10 - - - - - 10 - - - <td>- 10 to 4 to</td> <td>2,08</td>	- 10 to 4 to	2,08
87 2,093 47 746 65 307 60 1,185 21 1,492 81 90 - - - - - 51 - - - - - 90 4,423 23 2,421 23 - 31,990 67 1,597 45 46 4,190 26 831 60 378 76 785 41 1,007 09 - - - - - - 55 3,313 44 1,410 23 - 1,31,967 97 1,214 38 73 - - - - - 90 - - - - - 13 - - - - - 13 - - - - - 13 - - - - -		2,086
61		2,089
51		2,089
99 4,423 23 2,421 23 - 31,990 67 1,597 45 46 4,190 26 831 60 378 76 785 41 1,007 09 55 3,313 44 1,410 23 - - - - - - 60 - - - - - - - - 73 - - - - - - - 11 - - - - - - 11 - - - 3 76 12 - - - - - 13 - - - - 14 - - - - - 15 - - - - - 11 - - - - - -		2,086
46 4,190 26 831 60 378 76 785 41 1,007 09 55 3,313 44 1,410 23 - - - - 73 - - - - - 00 - - - - - 03 - - - - 11 - - 3 76 3 76		1 100
55 3,313 44 1,410 23 - 1,31,967 97 1,214 38 73		#0A
55 3,313 44 1,410 23 - 1,31,967 97 1,214 38 73	1	
73		1,296 53
1 1 1 1 1 1 1 1	2,007 75	
3 76		2,250 83
1 1	0 686 0	
	- 545 11	
226 50		

¹ Received sprayer from State, town paying one-half the cost, \$600.
² Work financed by State.

³ Town paid part of the amount for supplies.
⁴ Town paid full cost of supplies.

			1913.				19	1914.			1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	TING N TOWNS
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expenditure.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Dover,	67	\$97 40	\$3 20	96 66\$	\$3,079 54	\$2,978 20	\$807 48	1		1	\$3,354 20	1	1
Dracut,	က	576 66	320 54	897 20	1,008.01	1,495 23	1,253 52	\$487 22	\$849 75	\$1,336 97	1,012 66	-	1
Dudley,	က	1	1	1	825 65	ı	1	1	I	1	848 20	1	1
Dunstable,	က	733 78	140 24	874 02	171 65	1,407 07	274 81	910 42	1 1,188 65	1,774 07	163 98	1	ı
Duxbury,	က	309 72	269 04	578 80	1,764 16	2,169 09	1,060 25	199 04	202 35	401 39	1,456 14	1	1
East Bridgewater, .	63	1	1		945 66	1,701 54	466 25	1	1 1,930 39	1,330 39	1,062 14	1	t
Easton,	2	1	2 12 50	ı	2,792 83	1	1	1	ı	ı	2,847 19	-	1
Essex,	က	82 862	85 56	684 34	501 86	773 26	458 60	271 40	141 22	412 62	507 19	1	1
Everett,	1	1	1	1	2,000 00	I	ı	1	1	1	2,000 00	1	2
Fairhaven,	က	1	1	I	1,631 10	ı	ı	1	ı	1	1,400 44	1	1
Fall River,		1	1	1	5,000 00	ı	1	1	1	1	2,000 00	-	1
Falmouth,	2-1	ł	1	1	4,341 80	1	ı	1	ı	1	2,000 00	-	1
Fitchburg,	1	ı	1 87	1 87	5,000 00	ł	1	1	1	1	2,000 00	-	1
Foxborough,	က	ı	1	1	1,059 05	1	1	1	t	1	1,093 67	ı	. 1
Framingham,	1	ı	1	1	2,000 00	1	ŧ	1	ı	1	2,000 00	-	ı
Franklin,	က	1	1	1	1,880 97	ı	1	1	1	1	1,918 97	ı	t
Freetown,	8	1	1	1	407 73	1	ı	1	ı	1	353 78	1	1
Gardner,	2	1		1	4,195 02	1	1	1	ı	'	4,538 55	,	1

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1	-	1	1	1	1	1	ı	-	1	-	1	1	1	2	1	-	1	1	ı	1
528 67	2,000 00	1,297 49	2,770 19	2,000 00	1,768 95	506 16	269 24	2,466 01	842 74	593 40	723 44	669 28	2,000 00	3,314 48	680 29	743 11	813 98	2,682 36	755 66	302 89
1,715 93	263 09	1	1	1	1,054 94	706 37	683 92	774 01	2,640 48	663 88	1,813 47	1	ı	1,007 55	1	2,308 49	28	1	133 42	1
406 49 11,909 44	8 526 18	1	1	1	754 94	163 23	22 76	774 01	1,176 11	276 76	1 2,405 56	1	1	3 1,258 18	1	299 57	58	1	68 09	1
406 49	1	ı	1	1	300 00	543 14	91 199	1	1,464 37	387 23	7 91	1	1	1	1	2,008 92	ı	1	72 53	1
812 90	1,513 26	150 00	1	1	187 60	485 59	436 09	976 48	975 53	628 81	990 02	1	2,041 97	2,464 84	1	529 50	1	1	173 25	234 65
1,515 86	5,471 58	803 84	1	1	2,150 40	1,035 47	923 33	2,242 93	2,248 57	967 84	1,309 97	1	5,695 40	3,239 71	٠,	4 2,734 76	1	ı	19 662 +	538 53
509 37	5,000 00	1,219 66	2,749 12	4,597 02	1,735 29	492 33	262 17	2,080 78	784 20	580 61	702 06	627 67	5,000 00	3,281 43	661 97	725 84	807 10	2,388 25	727 08	315 47
1,552 58	936 40	1	1	2 01	582 58	862 55	534 60	1,243 01	1,107 05	617 05	1,412 07	1	24	1,809 33	1	225 54	1	ı	676 35	150 33
454 95	213 83	ı	1	2 01	535 07	193 26	12,191	843 01	374 92	57 32	532 23	1	24	1,8 2,711 66	1	8 40	ı	1	89 23	1
1,097 63	829 48	1	1	1	47 51	669 29	521 69	400 00	732 13	559 73	879 84	1	ı	1	1	217 14	1	ı	587 12	. 150 33
673	1	מי	2	2-1	က	က	က	က	က	က	60	က	1	2	က	က	က	က	က	က
-	•		•	•		•	•	•	•	•		•	•	•	•	•	•			•
			ton,																	
Georgetown,	Gloucester,	Grafton, .	Great Barrington,	Greenfield,	Groton, .	Groveland,	Halifax, .	Hamilton, .	Hanover, .	Hanson, .	Harvard, .	Harwich, .	Haverhill, .	Hingham, .	Holbrook, .	Holden, .	Holliston, .	Hopedale, .	Hopkinton,	Hubbardston,

 1 Received sprayer from State, town paying one-half the cost, \$600. 2 Town paid full cost of supplies.

3 Town paid part of the amount for supplies.
4 Work financed by State.

			1913.				. 19	1914.			1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	YING N TOWNS ITIES.
CITIES AND TOWNS.	Class.	, Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Hudson,	က	\$199 57	\$301.86	\$501 43	\$1,659 29	\$2,258 02	\$958 40	1	1\$1,976 21	\$1,376 21	\$1,692 78	1	1
Hull,	67	ı	1	1	3,258 48	1	1	1	t	ı	3,548 58	1	1
Ipswich,	က	456 63	779 22	1,235 85	2,196 02	2,445 27	1,305 30	\$249 25	957 38	1,206 63	2,210 78	-	2
Kingston,	က	1,341 43	361 94	1,703 37	671 96	1,804 70	534 98	1,132 74	294 73	1,427 47	672 99	1	ı
Lakeville,	က	1	1	ı	464 75	ı	1	ł	1	1	513 60	1	ı
Lancaster,	67	1	1	1	2,744 58	ı	1	1	1	1	2,765 93	1	1
Lawrence,	-	ı	1	1	5,000 00	1	1	1	ı	1	2,000 00	1	63
Leicester,	က	1	1	1	1,002 99	1	8	1	ı	1	1,021 31	ı	1
Lenox,	67	1	1	1	3,585 22	ı	1	1	ı	. 1	3,645 75	ı	ı
Leominster,	-	1	1	1	5,000 00	1	1	ı	1	ı	2,000 00	ı	1
Lexington,	67	1,723 83	2,461 24	3,932 82	3,425 04	2 5,131 48	1,385 16	1,098 57	931 09	1,843 44	3,605 05	63	က
Leyden,	က	ı	1	ı	1	1	1	ı	1	1	91 19	ı	ı
Lincoln,	က	ı	13,727 66	3,127 66	1,751 04	2,072 52	1,656 41	162 48	1,700 38	1,862 86	1,604 02	က	1
Littleton,	က	312 86	1 1,964 62	1,677 48	477 62	821 09	93 25	343 47	697 82	1,041 29	493 03	1	1
Lowell,	-	1	1	ı	2,000 00	5,848 40	4,598 60	ı	386 58	193 29	2,000 00	23	1
Lunenburg,	·m	489 26	1 1,855 53	1,744 79	557 11	1,219 57	1,731 28	662 46	676 75	1,339 21	602 52	1	1
Lynn,	-	1	ı	1	2,000 00	3,712 52	ı	1	1	1	2,000 00	63	23
Lynnfield,	e0	1,981 77	656 95	2,608 69	507 20	2,357 01	554 55	1,849 81	567 44	2,417 25	525 74	1	1

Manchester, 1 — — — 1,768 66 —	Malden,	•	-	1	1	1	5,000 00	1	1	1	1	1	5,000 00	-	co
3 - <td></td> <td>•</td> <td>1</td> <td>1</td> <td>1</td> <td>ı</td> <td>2,000 00</td> <td>ı</td> <td>1</td> <td>1</td> <td>ı</td> <td>ı</td> <td>5,000 00</td> <td></td> <td>1</td>		•	1	1	1	ı	2,000 00	ı	1	1	ı	ı	5,000 00		1
3,764 06 -<			က	1	1	1	1,768 66	1	1	1	ı	1	1,342 09	1	1
3 -		·	2	1	ı	ı	3,764 06	ı	ı	1	1	1	4,444 38	1	-
	•		က	4	ı	1	2,066 85	ı	1	ı	ı	1	2,350 14	1	ı
	•		2	141 49		824 79	4,289 75	2 5,063 65	2,295 13		1,32,486 28	1,629 03	4,402 46	67	1
	•		က	659 00	798		1,129 52	1,929 27	972 75	799 75	871 93	1,671 68	1,045 51	1	1
	•		က	1,328 06		1,614 80		878 03	47 00	00 844	253 03	1,031 03	106 40	1	ı
	•		က	1	1	6	740 39	1	1	1	1	1	758 23	1	1
	•	•	က	1	1 1,542 04	942 04	1,637 82	1,587 88	304 70	ı	1	1	1,652 82	1	1
	•		က	1	1	1		1	1	ı	1	1	1,022 12	1	, 1
	•		1	1	4 1,040 94	1	2,000 00	4,019 88	1	1	4 640 40	ı	2,000 00	ı	1
1 - - - 5,000 00 -	٠	•	က	1	1	1		1	ı	1	1	1	716 36	1	1
3 - <td></td> <td>·</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>2,000 00</td> <td>1</td> <td>1</td> <td>ı</td> <td>ı</td> <td>1</td> <td>2,000 00</td> <td>2</td> <td>1</td>		·	1	1	1	1	2,000 00	1	1	ı	ı	1	2,000 00	2	1
		•	က	ı	ı	ı		1	1	1	1	1	287 03	1	ı
2 159 77 907 65 885 89 3,380 68 3,726 52 2,426 59 65 66 31,135 05 973 70 3 770 00 681 09 1,451 09 1,993 88 2,799 43 1,329 90 805 55 836 47 1,642 02 3 1,048 93 301 09 1,350 02 364 61 1,204 97 216 56 840 36 226 83 1,067 19 2 - - - 4,029 46 - - - - - - 3 - - - 1,186 66 - - - - - -	٠	•	က	776 80		991 90	513 78	1,465 74	368 63	921 96	216 59	1,168 55	537 47	1	63
3 770 00 681 09 1,451 09 1,993 88 2,799 43 1,329 90 805 55 836 47 1,642 02 3 1,048 93 301 09 1,350 02 364 61 1,204 97 216 56 840 36 226 83 1,067 19 2 4,029 46 1,186 66	•		2	159 77	206	885 89	3,360 68	3,726 52	2,426 59	65 66	3 1,135 05	973 70	3,754 86	က	63
301 09 1,350 02 364 61 1,204 97 216 56 840 36 226 83 1,067 19 4,029 46	zh,		က	770 00	681	1,451 09	1,993 88	2,799 43	1,329 90	805 55	836 47	1,642 02	1,986 31	1	1
	٠	•	က	1,048 93		1,350 02	364 61	1,204 97	216 56	840 36	226 83	1,067 19	371 73	.1	2
1,186 66			67	1	ı	1	4,029 46	1	1	1	1	1	4,061 36	1	t
		·	က	1	1	1	1,186 66	ı	1	1	1	1	1,285 32	1	ı

¹ Received sprayer from State, town paying one-half the cost, \$600.
² Work financed by State for month of December.

³ Town paid part of the amount for supplies.
⁴ Town paid full cost of supplies.

			1913.				-	1914.			1915.	SPRA OUTHITS AND (SPRAYING OUTHING IN TOWNS AND CITIES.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Millis,	က	1	ı		\$547 23	1	1	1	1	1	\$558 17	-	
Milton,	1	1	1 \$4,302 76	\$1,911 61	5,000 00	\$1,092 13	1	1	2 \$18 50	I	2,000 00	က	ŧ
Nahant,	2	1	ı	ı	3,627 12	ı	ı	1	1	ı	3,474 48	1	-
Nantucket,	က	1	1	ı	1,736 82	1	1	1	40	\$0 40	1,836 92	1	1
Natick,	2	1	2 87 80	1	3,536 28	3,419 96	\$2,408 82	ı	2 92 15	ı	3,647 16	က	ı
Needham,	23	\$355 99	ı	355 99	3,110 46	1	ı	1	1	1	3,365 53	1	1
New Bedford,	1	1	1	1	5,000 00	t	1	1	1	1	5,000 00	1	1
New Braintree,	60	1	1	1	169 27	ı	ı	1	1	ı	164 95	ı	1
New Salem,	က	1	1	I	157 03	ı	î	ı	1	ı	162 70	ı	ŧ
Newbury,	က	1,370 11	581 79	1,951 90	604 00	1,653 14	785 28	\$1,049 05	531 58	1,580 63	635 69	1	2
Newburyport,	1	1	1	f	5,000 00	ı	1	ł	1	ı	5,000 00	1	-
Newton,	1	2,000 00	9,849 28	6,924 64	5,000 00	12,986 61	19,684 39	1,598 54	4,789 55	3,993 31	5,000 00	2	1
Norfolk,	က	130 71	111 58	242 29	479 03	825 93	189 45	346 90	111 96	458 86	465 54	1	7
North Andover,	ဗ	98 10	538 20	636 30	2,229 00	2,093 66	1,374 16	1	1 775 57	640 23	2,301 33	1	7
North Attleborough,	2	1	1	1	3,828 41	1	1	1	I	1	3,876 10	-	1
North Brookfield, .	က	1	1	1	765 03	1	ı	1	1	1	800 17	ı	1
North Reading, .	က	2,278 38	1,344 45	3,622 83	367 70	1,953 37	981 59	1,585 67	1,017 92	2,603 59	393 09	-	1
Northborough,	က	78 37	8 1,492 33	970 70	738 19	1,542 54	244 35	904 35	448 73	1,353 08	170 71	-	1

i	-	,	,		ı	1	1	1	ı	1	-	1	1	1	1	1	1	-	1
1	1	-	1	1	1	ı	1	1	1	1	-	1	-	1	1	-	2	ı	1
2,232 67	09 999	475 65	4,449 52	00 644	147 11	1,605 70	1,534 24	836 65	2,103 39	163 18	2,000 00	466 61	943 42	460 97	124 70	417 16	2,000 00	182 82	594 05
,	1	1,636 43	1	1	1	ı	ı	ı	1	1	1	1,972 54	1,509 32	1	1	350 97	1	2,073 93	7,598 32
1	1	1,231 53	1	1	ı	ŧ	t	1	1	1	ı	3 1,920 17	671 79	1	1	150 97	1	284 34	682 96
1	1	404 90		1	ı	1	1	1	1	1	1	652 37	937 53	ı	ı	200 00	1	1,789 59	6,915 36
•	1	1,090 69	1	1	ī	1	1	1	1	1	1	446 75	527 12	1	1	59 22	1	168 12	98 169
'	1 86 00	867 84	1	1	ı	1	1	1	1	1	1	1,687 18	1,864 28	1	1	77 067	ı	1,963 84	4 7,511 84
2,210 49	01 929	462 94	6,000 00	765 61	151 92	1,622 09	1,478 52	825 79	2,115 00	158 87	2,000 00	434 81	926 75	444 69	116 14	414 68	6,000 00	174 25	596 48
1	1	1,610 00	1	ı	1	ı	ě	ı	1	1	1	1,519 57	1,427 67	ı	ī	1	1	1,637 98	1 80
1	1	1,021 27	1	1	1	1	1	1	ı	1	1	63 60	422 93	1	1	1	1	134 08	1 80
1	1	588 73	1	1	1	ı	1	-1	1	1	ŧ	1,455 97	1,004 74	1	1	f	1	1,503 90	ı
e2	co	en	1-2	60	00	60	ಣ	es	60	65	1	60	eo	62	60	60	1	60	က
-		•					•	•	•		•					•		•	
Northbridge,	Norton, .	Norwell, .	Norwood, .	Oak Bluffs,	Oakham, .	Orange, .	Orleans, .	Oxford, .	Palmer, .	Paxton, .	Peabody, .	Pembroke,	Pepperell, .	Potersham,	Phillipston,	Plainville, .	Plymouth,	Plympton,	Princeton, .

1 Town paid part of the amount for supplies.

² Town paid full cost of supplies.

 3 Received sprayer from State, town paying one-half the cost, \$600. 4 Work financed by State.

			1913.				16	1914.			1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	TING TOWNS
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Quincy,	1	ı	1\$1,146 64	\$904 77	\$5,000 00	\$4,949 96	\$966 33	1	2 \$1,133 92	\$	\$5,000 00	63	1
Randolph,	က	1	1	ı	1,129 50	t	ı	ı	ı	1	1,153 50	ı	1
Raynham,	က	1	1 61 23	23 81	365 10	3 487 73	130 77	\$122 63	47 45	\$170 08	313 30	1	1
Reading,	73	\$133 33	1,464 88	1,305 23	2,788 71	3,291 58	2,201 25	32 28	1,850 11	1,512 37	3,007 58	63	Ħ
Rehoboth,	က	ı		ı	411 04	ŧ	- 1	ı	1	ŧ	328 34	1	1
Revere,	-	1	1	1	2,000 00	8 57 25	ı	ı	ı	ı	2,000 00	1	1
Rochester,	က	ı	2 29 35	11	383 62	ı	1	1	ı	t	415 98	ı	1
Rockland,	က	1	ı	1	2,091 52	ſ	1	1	ı	1	2,171 19	1	1
Rockport,	က	313 72	1	313 72	1,563 59	1,653 35	1,135 91	ı	1	ŧ	1,609 42	-	က
Rowley,	က	220 07	246 50	466 57	919 07	596 16	890 46	ı	1 608 57	285 66	869 73	-	1
Royalston,	က	1	2 3 90	ı	288 25	106 98	193 10	ı	ı	1	299 39	1	1
Rutland,	က	ı	1	ı	342 78	1	1	1	ı	1	366 93	1	1
Salem,	П	ı	1	1	2,000 00	1	1	1	1	ı	5,000 00	1	1
Salisbury,	က	898 91	304 22	1,203 13	571 86	1,379 22	480 47	207 36	4 1,874 54	1,481 90	590 16	1	23
Sandwich,	က	295 81	139 99	435 80	520 32	739 94	90 20	219 62	156 93	376 55	570 50	ı	I
Saugus,	7	1,798 32	763 79	2,409 35	2,670 32	3,991 11	2,224 13	851 16	851 16 11,027 34	1,673 03	2,777 34	23	1

r	1	1	1	1	1	1	ı	1	ı	ı	1	1	63	ı	1	1	1	1	1
63	ı	1	1	1	1	1	1	63	1	1	1	1	1	1	1	1	1	1	1
2,279 01	637 08	1,484 78	957 37	524 04	1,090 37	615 49	2,000 00	926 47	1,457 87	2,000 00	508 38	1,991 67	2,362 14	1,666 30	462 68	376 69	599 43	583 98	5,000 00
3,812 71	1	1	264 64	565 21	38 61	1	ı	587 40	'	1	1,272 83	ı	746 68	976 48	1,848 60	ı	1,702 99	ı	1
1,063 61	1	1	1 326 74	405 15	38 61	1	1	238 46	1	ı	426 59	1 .	622 69	90 998	4 2,248 60	1	746 22	- 1	1
2,749 10	1	1	ı	160 06	1	1	ł	348 94	1	1	846 24	ı	66 69	110 42	200 00	1	22 926	1	1
1,500 00	1	ı	1,087 00	141 90	493 59	1	ı	849 23	ı	ı	243 26	1	1,586 78	853 00	386 24	1	516 21	1	1
4,967 58	1	1	830 60	665 34	1,048 80	1	1	1,264 13	1	1	1,425 67	1	2,315 11	1,721 22	1,483 34	1	1,939 18	1	1
2,218 48	659 45	1,487 41	892 70	505 28	1,001 17	89 629	2,000 00	856 04	1,408 47	2,000 00	499 84	1,703 57	2,140 83	1,610 80	448 54	372 80	558 91	611 92	2,000 00
6,356 75	1	1	481 07	354 66	1	1	1	859 70	1	1	331 17	1	641 36	1	1,183 24	1	1,634 11	1	1
3,045 05 5 4,511 70	1	1	333 19	313 83	2 38 81	1	1	4 1,459 70	1	1	1 336 75	1	1 688 48	1	403 49	1	455 90	1	1
3,045 05	1	1	147 88	40 83	1	1	ı	ı	1	ı	ı	1	1	1	779 85	1	1,178 21)	3
60	60	es	က	00	60	က	1	က	က	-	က	co	63	co	co	es	က	က	1
•		٠																	
		٠																	
Scituate, .	Seekonk, .	Sharon, .	Sherborn, .	Shirley, .	Shrewsbury,	Somerset, .	Somerville,	Southborough,	Spencer, .	Springfield,	Sterling, .	Stockbridge,	Stoneham,	Stoughton,	Stow, .	Sturbridge,	Sudbury, .	Sutton, .	Swampscott,

· Received sprayer from State, town paying one-half the cost, \$600.

1 Town paid part of the amount for supplies. ² Town paid full cost of supplies. 8 Work financed by State.

⁵ Received two sprayers from State, town paying one-half the cost, \$1,200.

YING N TOWNS ITIES.	Small.	1	1	ı	1	1	ı	1	ı	ı	1	1	ı	1	1	1	,
SPRAYING OUTFITS IN TOWNS AND CITIES.	Large.	ı	1	ı	1	ı	1	ı	t	ı	1	63	1	73	-	ı	1
1915.	Required Expenditure.	\$499 77	5,000 00	06 682	676 85	1,628 20	267 99	169 23	283 11	507 46	1,608 55	4,766 51	2,864 54	2,000 00	1,918 00	1,024 81	187 68
	Total Amount received from State.	1	ı	\$1,626 86	2,170 15	2 207 51	1,154 70	1	2,632 18	1	1	1	1	1,408 77	1	1	t
	Tools Supplied.	ı	1	\$243 73	1,018 45	294 91	552 84	1	1,021 85	1	1	4 827 18	1	1,454 30	1	ı	ı
1914.	Re- imburse- ment.	ı	ı	\$1,383 13	1,151 70	ı	98 109	1	1,610 33	ı	1	ı	1	681 62	•	t	1
191	Private Work.	ı	1	\$745 70	342 81	668 14	552 30	ı	728 73	ı	1	1	1	5,539 54	ı	ı	ı
	Total Net Expendi- ture.	1	ı	1\$2,117 90	1,797 53	1 1,340 03	1,148 77	1	1,880[29	1	ı	1	1	7,817 54	1	1	1
	Required Expendi- ture.	\$706 68	5,000 00	734 77	645 83	1,427 43	546 91	163 22	269 96	504 47	1,503_98	4,602140	2,762 19	5,000 00	2,218 48	979 44	182 51
	Total Amount received from State.	ı	1	\$1 69	1,398 18	532 40	1,415 38	1	2,365 90	1	1	1	ı	1,148 93	1	1	1
1913.	Tools Supplied.	1	1	\$1 69	598 20	194 85	286 69	I	3 2,228 41	1	ı	4 829 <u>7</u> 68	1	1,779 41	1	1	1
	Re- imburse- ment.	1	ı	1	\$799 98	337 55	1,128 69	1	737 49	ı	1	1	1	259 23	1	1	ı
	Class.	က	1	က	က	က	က	60	က	က	က	23	က	1	က	က	8
	N. N.	•	•		•	•	•	•	•	٠	٠	•	•	•	•	•	-
	Tow																
	CITIES AND_TOWNS.	Swansea, .	Taunton, .	Templeton,	Tewksbury,	Topsfield,	Townsend,	Truro, .	Tyngsborough,	Upton, .	Uxbridge,	Wakefield, .	Walpole, .	Waltham, .	Wareham, .	Warren, .	Warwick, .

Received sprayer from State, town paying one-half the cost, \$600.
 Town paid full cost of supplies.

Watertown, .	-	-	1.	1	1	5,000 00	•	1	1	1	1	2,000 00		ľ
Wayland,		63	243 33	766 15	1,009 48	1,214 60	1,480 04	1,296 26	265 44	922 70	1,188 14	1,205 84	1	1
Webster,		63	1	1	ı	2,851 88	1	ı	1	1	1	3,376 96	ı	1
Wellesley,		1	1	43 50	ı	2,000 00	5,467 12	1,588 76	1	1	1	2,000 00	က	1
Wellfleet,	•	69	ı	1	1	352 84	1	1	1	1	1	336 92	1	1
Wendell,		63	1	1	1	'	1	1	1	1	ı	202 15	1	ı
Wenham,		က	1	8 1,589 19	989 19	1,064 16	1,605 88	600 95	275 25	571 71	846 96	1,321 30	-	1
West Boylston, .		65	1	1	1	380 42	366 25	270 07	1	11	77	397 72	1	1
West Bridgewater,		က	567 85	277 02	844 87	621 62	1,463 88	631 63	842 26	366 55	1,208 81	656 62	1	ι
West Newbury,		က	952 20	318 45	1,270 65	436 80	986 27	464 96	549 47	215 42	764 89	430 32	-	23
Westborough, .		က	1	3 1,850 17	1,250 17	1,309 46	1,686 99	466 48	377 53	138 61	516 14	1,333 45	1	1
Westford,		က	983 55	1,045 41	2,028 96	882 21	1,498 03	776 75	615 82	912 82	1,528 64	902 64	1	1
Westminster, .		က	610 03	102 56	712 65	396 36	2,367 41	218 60	1,971 05	130 62	2,101 67	390 89	1	1
Weston,		63	982 80	33,700 90	3,583 52	3,248 27	5,805 99	1,920 30	1	1,539 63	1,231 70	3,516 77	70	ı
Westport,		က	1	1	1	912 68	1	1	1	1	1	813 32	1	1
Westwood, .		က	1	1	1	1,640 03	1	1	1	1	1	1,788 42	1	ı
Weymouth, .		63	ı	2 2,360 53	1,774 63	4,587 23	3,982_14	1,667 25	1	2 1,873 06	1,014 38	4,808 27	2	ı
Whately,		co	1	1	1	1	1	ı	1	5 26	ı	291 84	1	ı
Whitman, .	•	က	1	1	ı	2,229 69	i	ī	ī	ı	1	2,256 00	1	1
Wilbraham, .	•	က	1	1	ı	489 82	1	1	1	1	1	566 35	1	1
Wilmington, .	•	က	1,686 44	1,686 44 \$2,586 52	3,672 96	726 89	2,023 46	1,315 74	1,296 57	812 67	2,109 24	792 29	1	1

Work financed by State.

² Town paid part of the amount for supplies.

			1913.				19	1914.			1915.	SPRAYING OUTFITS IN TOWNS AND CITIES.	TING N TOWNS TIES.
CITIES AND TOWNS.	Class,	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Required Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools Supplied.	Total Amount received from State.	Required Expendi- ture.	Large.	Small.
Winchendon,	က	\$147 82	\$179 17	\$326 99	\$1,720 71	\$2,623 28	\$750 44	\$902 57	\$325 73	\$1,228 30	\$1,737 45	-	1
Winchester,	1	1	1	1	2,000 00	ŧ	1	1	1	1	5,000 00	-	1
Winthrop,	-	1	1	8	2,000 00	ī	1	1	ı	1	5,000 00	7	1
Woburn,	63	3,628 61	1,418 76	4,763 62	4,828 12	8,515 98	1,344 69	2,776 85	867 21	3,470 62	4,933 61	-	1
Worcester,	-	1	1	1	2,000 00	10,195 53	13,547 13	1	1,2 3,024 06	1,512 03	5,000 00	က	ı
Wrentham,	က	1	1	1	587 68	1	1	1	ı	ı	620 34	1	1
Yarmouth,	က	1	1	ı	1,020 00	ī	Ī	ı	ı	1	1,048 39	1	ı

² Town paid part of the amount for supplies. ¹ Received sprayer from State, town paying one-half the cost, \$600.

Conclusion.

Each year heretofore the annual report of the State Forester has concluded with the following heading: "Summary of Recommendations." This is omitted this year, as we are not asking for any new legislation other than is covered in the general estimates that have been sent to the State Auditor.

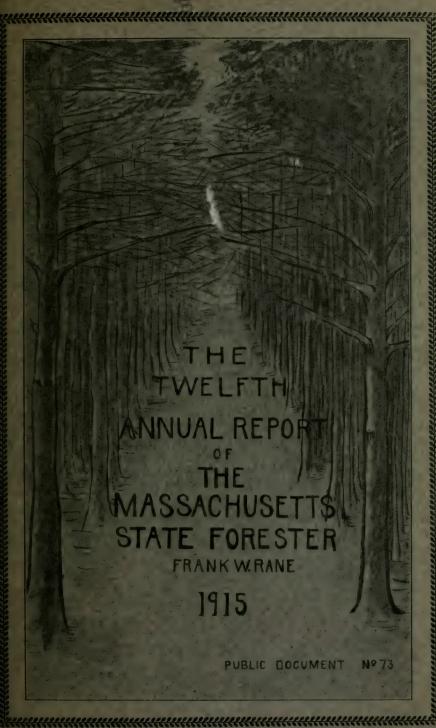
I am pleased to say that with the legislation of the last General Court, the general program outlined by this department for securing the fundamentals of a State forest policy, which has extended over a period of eight years, has been covered.

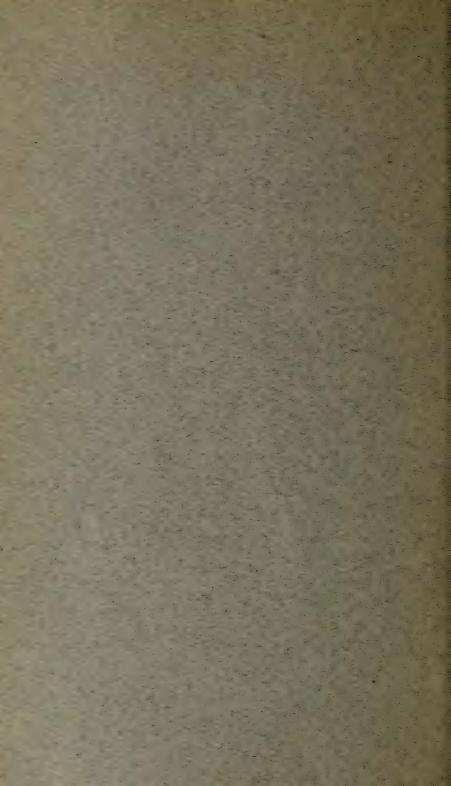
We are, therefore, now in a position to exert our best energies in accomplishing results. Let us all have a part in this splendid work.

Respectfully submitted,

F. W. RANE, State Forester.







THE

STATE FORESTER

MASSACHUSETTS.

TWELFTH ANNUAL REPORT,

1915.

F. W. RANE, STATE FORESTER.



BOSTON:

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The Commonwealth of Massachusetts.

To the General Court.

In accordance with the provisions of chapter 409, section 5, Acts of 1904, it becomes my duty and pleasure to submit this, the annual report of the State Forester, for the past year.

The usual hearty co-operation on the part of our citizens, as well as that of the General Court, has made the year's work very pleasant and agreeable to perform.

Respectfully submitted,

F. W. RANE, State Forester.

DEC. 20, 1915.



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Forest utilization. Buck's chair factory, West Sterling, Mass. This photograph shows what can be used in making chairs. The utilization of the poorer classes of forest products gives opportunity for better management of the woodlands.

The Commonwealth of Massachusetts.

TWELFTH ANNUAL REPORT OF THE STATE FORESTER.

Introduction.

The State Forester and his assistants have been extremely busy throughout the past season, not only in continuing the work reported upon in past years, but in embarking upon many new forestry enterprises. Our work has been very satisfactory in achieving definite results, and there has been real cooperation on the part of our citizens, which augurs well for future good.

Forestry work in the past has been looked upon by our people as dealing too much in futures, and we Americans have not been interested in long-time investments, but now that forest fires, insects and diseases are being combated and controlled more and more, forestry enterprises are being considered more favorably. They may be advantageously compared with life insurance policies. When land is purchased, planted and registered in accordance with the Massachusetts forest taxation law, the added growth each year becomes a commercially recognized dividend upon the investment.

If for any reason a person finds it burdensome to continue paying his insurance premiums he does not lose the investment already made, and he is even allowed to borrow on it as collateral. It is just so with a white-pine plantation. It will be unnecessary to wait until the trees are large enough to be cut into lumber, — the owner can find a ready market for well-stocked plantations at any stage of their growth. When reforestation is looked at in this light the long-time investment idea is overcome.

The satisfactory working of our reforestation law is proved by the fact that each year finds more lands in readiness to be turned over to us than we can accept. When the large tracts now under consideration are once acquired by the Commonwealth for State forests, a fair portion of which is adapted for immediate planting, the fund available under this law will naturally be used for reforestation on these lands.

The departmental activities during the year have been real forestry undertakings. In scanning this report the reader will find that practical operations and definite results have been the aim constantly in view. The organization of the work throughout the year has been more thorough and comprehensive. As the policy of a new and growing department becomes more stable, it is inevitable that each person assume more responsibility. Undoubtedly other plans for the readjusting of the department, thereby increasing its usefulness, which have for some little time been in the mind of the State Forester, would have been carried into effect but for the fact that the Commission on Economy and Efficiency has had a deputy in the department for the past year, making a study of its activities and methods. It was thought best to await this report, thus avoiding complications.

In addition to such lines of endeavor as forest thinning and management, forest fire work, reforestation and nursery work, inspection of locomotives, insect and disease work, there have been innumerable demands upon us for lectures, examinations, publications, meetings, exhibitions and experimental forestry work. We were also called upon to direct the expenditure of \$100,000 for work in aid of the unemployed during the winter and early spring. Large tracts of moth-infested woodlands have been operated by cutting, milling and selling the forest products, the expense of which was wholly met by the owners. We have also assisted the State Forest Commission in searching out large tracts of waste lands in various sections of the State, making surveys, looking up owners, titles, etc.

The slash law, which went into effect on Jan. 1, 1915, compelling all operators of woodlots to remove or burn the brush or slash for a distance of 40 feet from the railroad, highway or abutting woodland, has proved a step in the right direction,

and will undoubtedly be of great future value in providing fire lines.

The moth work of the year has been strenuous and effective. Our appropriation was lessened by \$25,000 as compared with the previous year. The fact that \$100,000 was turned over to the department for winter work for the unemployed doubtless accounted for this curtailment. While the work done by the unemployed was far more efficient than would have been thought possible, it was carried on at a season of the year when only certain kinds of work could be done. Work of a permanent nature was accomplished; hence our general conditions have been improved. On the other hand, our regular routine work of moth suppression, such as spraying, which could not be done until later in the season, suffered by this curtailment, and we found that careful planning was required to do the necessary summer work.

The United States government, through the Bureau of Entomology, continues to be responsible for preventing the spread of the gypsy moth, and has its picket line encircling the infested belt. Thus far the government men have been able to intrench themselves against the moth invasion, and it is certainly to be hoped that the insect can be held at bay, for once the government acknowledges defeat so much more territory will fall back upon the State to be handled. This department has continued to give the government assistance by doing more co-operative work in the border towns, thus helping to hold back the spread in those towns.

Our organization, equipment and methods of combating the moths throughout the infested areas have been far more effective than ever before. The Cape country is the section hardest hit at present. Instead of its being a scattered infestation, as it was a few years back, it has become general. This was inevitable, and it now devolves upon this section to cope with the problem by taking advantage of the experience gained in those sections earlier infested.

It is absolutely necessary for the State to adhere to its present well-defined policies for moth suppression. Although the task is a mammoth one, nevertheless there can be no question but that results are being obtained, and if the policy of secur-

ing efficient supervision and modern equipment in the towns and cities is encouraged, we believe it is only a matter of time when the destructive pests will be under control.

The work of the parasites and diseases is as encouraging as ever; we refer to Dr. Howard's report elsewhere in this publication for details regarding parasites.

That the economic forestry methods, combined with rational spraying and creosoting, are the practical solution of moth control is generally accepted at the present time. Our wide-awake division superintendents are enthusiastic over the results, and have taken so naturally to the handling of woodlands for moth control that some of them are qualifying as expert forest operators.

Forestry in general needs continued encouragement, and we feel that the General Court can ill afford to do aught else than to give it support through generous financial assistance until much of our waste lands are planted and our inferior woodlands are restocked and properly managed for definite results. This work is bound to cost the State something, but any farsighted statesman or economist can see the wisdom of such a policy.

One of the difficult and perplexing problems that forestry work has met in eastern Massachusetts has been our inability to secure competent woodchoppers. With the present-day tendency of our towns and cities to pay all laborers the same wage per day, and with the hours of work reduced to an eighthour day, it is no wonder that cordwood has become an expensive commodity. Chopping has become a lost art, and the sooner we resort to the practice of paying laborers by the cord or thousand feet, in order to obtain economic results, the better. Certainly a man who cuts one-half a cord a day is not worth as much as another who can put up two cords. It has been necessary, therefore, in a number of instances, to import labor into the town in order to make the work an economic success. This practice, however, is resulting in improving local standards and putting a premium upon the employment of men upon their real merits.

The State Forester has had reason to be proud of his organization the past year, for besides the regular work, the expenditure of \$100,000 in labor among the unemployed

during the winter and early spring were all supervised, with the bookkeeping this involved, in our office. This work was accomplished at no extra expense of supervision to the State, and hence the funds all went directly for the purpose intended,—the really worthy unemployed.

Many other activities are touched upon in this report than those mentioned in this introductory statement. It is hoped that the reader will catch some of the true inspiration of our work.

ORGANIZATION.

There have been very few changes in the personnel of the staff during the year.

We sustained a great loss in the sudden death of Mr. John Murdoch, Jr., A.M., one of the forestry assistants who had been connected with the department since 1911. He met his death last winter while superintending the removal of one of our portable camps at Randolph. He was a graduate of the Harvard Forestry School, and had spent several years in the west in the employ of the United States Forest Service. He was a man of keen intellect, and had become closely identified with our work. His untimely death was greatly deplored by all his colleagues, and it being the first accident befalling our staff it has had the effect of making the bond of fellowship among us closer than ever.

Mr. Guy W. Lucas, B.Sc., who was employed in the moth department work, was promoted to the position left vacant through the death of Mr. Murdoch.

Mr. Leroy F. Richardson, M.F., was connected with the department for a few months, but resigned to take work elsewhere.

The organization is at present as follows: -

GENERAL STAFF.

F. W. RANE, B.Agr., M.Sc.	,		State Forester.
C. O. BAILEY,			Secretary.
ELIZABETH HUBBARD, .			Bookkeeper.
ELIZABETH T. HARRAGHY,			Stenographer.
JENNIE D. KENYON, .			Stenographer.
MABEL R. HAMNETT, .		•	Clerk.
JAMES H. CROWLEY			Office boy.

GENERAL FORESTRY.

F. W. RANE, B.Agr., M.Sc.,	. State Forester.	
H. O. Cook, M.F.,	. Assistant forester	n charge.
F I HATTER RF	Forest everniner	

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J. R. SIMMONS, B.Sc.,			Reforestation work.
HAROLD FAY, M.F.,			Assistant forester.
EBEN SMITH, .			Superintendent, Barnstable Nur
Daniel Manney Day			Superintendent Amherst Nurse

Dean Townsley, Superintendent
J. L. Peabody, Field foreman.

James Morris, Field foreman.
H. N. Butler, Field foreman.
H. H. Chase, Field foreman.

STAFF, MOTH WORK.

F. W. RANE, B.Agr., M.Sc.,		State Forester.
GEO, A. SMITH,		Assistant (equipment, accounts, etc.).
PAUL D. KNEELAND, M.F.,		Assistant (woodlands, products, etc.).
RAY F. WESTON, M.F.,		Assistant.
GUY W. LUCAS, B.Sc.,		Assistant.

DISTRICT MOTH MEN.

Supplies.

1.	JOHN	W.	ENWRIGHT,	Medford.	

2. SAUL PHILLIPS, Beverly.

FRANCIS V. LEAROYD,

3. JOHN J. FITZGERALD, Haverhill. 4. Wm. A. HATCH, Marlborough. 5. HARRY B. RAMSEY, Worcester.

6. C. W. PARKHURST, Foxborough. 7. W. F. Holmes, East Braintree.

8. J. A. FARLEY, Plymouth.

STAFF, FOREST FIRE PREVENTION.

F. W. RANE, B.Agr.,	M.Sc.,				State Forester.
M. C. HUTCHINS,					State Fire Warden.
JOSEPHA L. GALLAGI	ER,				Secretary.
JAMES E. MOLOY,					Locomotive inspector.
MINER E. FENN, .					Locomotive inspector.

DISTRICT FOREST WARDENS.

1.	OSCAR L. NOYES,	Byfield.	3.	JOHN P. CROWE, Westbo
2	JOS J. SHEPHERD.	Pembroke.	4.	ALBERT R. ORDWAY, WE

OBSERVERS.

District 1.

E. GORDON BAILEY, Georgetown.
JOHN CHAPLIN, Sharon.
J. FRANK HAMMOND, Chelmsford.
CAPLIS McCORMICK, Essex.
JOHN H. O'DONNELL, Wakefield.
FREDERICK R. STONE, Sudbury.

District 2.

CALVIN BENSON, Barnstable.
M. J. ZILCH, Rehoboth.
FRANK L. BUCKINGHAM, Plymouth.
JOHN H. MONTLE, Fall River.
S. MATTHEWS, Middleborough.
CALVIN C. PARKER, Harwich.
W. F. RAYMOND, BOURNEdale.
CHAS. F. KIMBALL, Hanson.
W. I. MOODY, Falmouth.

District 3.

A. M. BENNETT, Pelham.
MICHAEL E. LYONS, Westborough.
F. H. LOMBARD, WARWICK.
GEORGE W. SHERMAN, Brimfield.
JAMES MALEY, Princeton.

District 4.

EDWARD J. McIntire, Becket.
N. C. Woodward, Shelburne Falls.
George C. Miller, Holyoke.
H. H. Fitzroy, Savoy.
C. B. Knowlton, Ashfield.
George Clifford, Williamstown.
ROBERT MILLER, Lenox.
CLAYTON BUNT, Mount Washington.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.

[Alphabetically by towns and cities.]

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
236, Rockland, .	A. B. Reed,	Abington,	C. F. Shaw,	7
10-4,	Wm. H. Kingsley,	Acton,	J. O'Neil,	4
2003-М,	H. F. Taber,	Acushnet,	A. P. R. Gilmore,	8
2-0, Kippers, .	John Clancy,	Adams,	John Clancy, .	5
1431-М,	E. M. Hitchcock,	Agawam,		_
161-6,	Wm. F. Milligan,	Alford,		-
274-M,	Jas. E. Feltham,	Amesbury,	A. L. Stover, .	3
541-M,	A. F. Bardwell,	Amherst,	W. H. Smith, .	5
212,	W. I. Morse,	Andover,	J. H. Playdon, .	3
35,	W. H. Pierce,	Arlington,	Daniel M. Daley,	1
2-12,	J. T. Withington,	Ashburnham, .	Chas. H. Pratt, .	4
8014,	Wm. S. Green,	Ashby,	Fred C. Allen, .	4
3-5,	Ralph Fredick,	Ashfield,		_
479-W,	Horace Piper,	Ashland,	Theodore P. Hall,	6
6 or 48-J,	Frank P. Hall,	Athol,	W. S. Penniman, .	5
34-4,	H. R. Packard,	Attleboro,	W. E. S. Smith, .	16
5-12,	J. F. Searle	Auburn,	J. F. Searle,	5
3259-М,	J. W. McCarty,	Avon,	W. W. Beals,	7
		Ayer,	D. C. Smith,	4
	H. C. Bacon,	Barnstable, .	Robt. Cross, .	18
83-4,	A. E. Traver,	Barre,	G. R. Simonds, .	5
18,	P. B. McCormick,	Becket,		_
	John I. Blake,	Bedford,	W. A. Cutler.	1
10-2	Jas. A. Peeso,	Belchertown, .	E. C. Howard.	5
8639-2, Milford, .	L. F. Thayer,	Bellingham, .	H. A. Whitney, .	6
409-W.	John F. Leonard,	Belmont,	C. H. Houlahan, .	1
14-6,	G. H. Babbitt,	Berkley,	A. A. Briggs, .	6
1367-M,	Walter Cole,	Berlin.	E. C. Ross,	4
2-13,	Edson W. Hale,	Bernardston, .	Edwin B. Hale,	5
319-Ј	Robt. Grant,	Beverly,	J. B. Brown,	2
22-2,	E. N. Bartlett,	Billerica,	John W. Bostwick,	1
875-L-1, Woon-	Thomas Reilly,	Blackstone, .	A. J. Gibbons.	5
socket, 12-2,	I. E. Whitney,	Blandford,		_
9-14,	E. E. Hurlburt,	Bolton,	C. E. Mace,	4
		Boston,	Park and Recreation Department.	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE NUMBER.	Forest Warden,	Town or City.	Local Moth Superintendent.	Div. No.
103-13,	Emory A. Ellis,	Bourne,	Edward D. Nick-	8
11-2, West Acton,	H. J. Livermore,	Boxborough, .	erson. C. E. Sherry, .	4
42-21,	Harry L. Cole,	Boxford,	C. Perley,	- 3
4-4,	John N. Flagg,	Boylston,	R. B. Smith, .	5
433-R,	J. M. Cutting,	Braintree,	Clarence R. Bes-	7
	T. B. Tubman,	Brewster,	tick. David L. Harwood,	18
281-3,	F. C. Worthen,	Bridgewater, .	F. C. Worthen, .	7
18-2,	Geo. E. Hitchcock,	Brimfield,	C. W. King,	5
1041,	Harry L. Marston,	Brockton,	George C. Kane,	7
104-13,	P. E. Gadaire,	Brookfield,	J. H. Conant, .	5
376,	Geo. H. Johnson,	Brookline,	Ernest B. Dane, .	1
52-8,	Gilbert E. Griswold, .	Buckland,		-
15-4,	Walter W. Skelton,	Burlington, .	W. W. Skelton, .	1
47-M,	F. C. Estes,	Canton,	A. Hemenway, .	7
		Cambridge, .	J. F. Donnelly, .	1
76-M, Concord, .	G. G. Wilkins,	Carlisle,	G. G. Wilkins, .	1
16-2,	H. F. Atwood,	Carver,	H. F. Atwood, .	18
14-12,	A. L. Veber,	Charlemont, .		_
42-2,	Edward A. Lamb,	Charlton,	J. D. Fellows,	5
28-3,	Geo. W. Ryder,	Chatham,	Chas. R. Nicker-	8
1597-R, Lowell, .	A. C. Perham,	Chelmsford, .	son. M. A. Bean,	1
		Chelsea,	J. A. O'Brien,	1
236-W,	George Korn,	Cheshire,		_
7-4,	Wm. E. Major,	Chester,		_
4,	Chas. A. Bisbee,	Chesterfield, .		_
149-M,	John E. Pomphret,	Chicopee,	John F. Sullivan,	5
	Robt. W. Vincent,	Chilmark,	A. S. Tilton,	8
352-24,	D. W. Blanchard,	Clarksburg, .	Chas. E. Wemple,	5
312-W,	A. J. Robinson,	Clinton,	John B. Connery,	4
260,	Wm. J. Brennock,	Cohasset,	George Young, .	7
23-2,	Frank A. Walden,	Colrain,	Edgar F. Copeland,	5
75-W,	Frank W. Holden,	Concord	H. P. Richardson.	4
15-2,	Edgar Jones,	Conway,		_
8001,	Thos. A. Gabb,	Cummington, .		_
42-12,	S. L. Ceasar,	Dalton,		_
	Thos. L. Thayer,	Dana,	T. L. Thayer,	5
295-W,	M. H. Barry,	Danvers,	T. E. Tinsley,	2
			2. 2. 1115103,	

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
14-3, Westport, .	E. W. Reed,	Dartmouth, .	E. M. Munson, .	8
373,	H. J. Harrigan,	Dedham,	J. T. Kennedy, .	7
273-14, Greenfield,	Wm. L. Harris,	Deerfield,	Wm. L. Harris, .	5
	Chas. E. Pierce,	Dennis,	H. H. Sears, .	8
29-3,	Ralph Earle,	Dighton,	F. C. Lane,	6
11-4,	Wm. L. Church,	Douglas,	F. J. Libby,	5
373-3,	John Breagy,	Dover,	H. L. MacKenzie,.	6
3353-2,	Frank H. Gunther, .	Dracut,	T. F. Carrick, .	1
152-2, Webster, .	Frank A. Putnam,	Dudley,	Herbert J. Hill, .	5
5-11, Tyngsbor-	Archie W. Swallow, .	Dunstable,	W. H. Savill, .	4
ough. 4-2,	Henry A. Fish,	Duxbury,	H. A. Fish,	7
46-5,	R. H. Copeland,	E. Bridgewater, .	Frank H. Taylor,	7
		E. Longmeadow,		_
24-3,	A. L. Gill,	Eastham,	N. P. Clark, .	8
2-11,	J. M. Dineen,	Easthampton, .		-
76,	Frederick Hanlon,	Easton,	R. W. Melendy, .	6
241-2,	Manuel Swartz,	Edgartown, .	John P. Fuller, .	8
165-25,	Frank Bradford,	Egremont,		-
17-11,	H. A. Coolbeth,	Enfield,	H. C. Moore, .	5
	C. H. Holmes,	Erving,	Charles H. Holmes,	5
	Otis O. Story,	Essex,	O. O. Story,	2
		Everett,	P. O. Sefton,	1
1686-Y,	Chas. F. Benson,	Fairhaven,	G. W. King,	8
822-W,	Wm. Stevenson,	Fall River,	Wm. Stevenson, .	6
136-2,	H. H. Lawrence,	Falmouth,	W. B. Bosworth, .	8
745,	P. S. Bunker,	Fitchburg,	Page S. Bunker, .	4
9417-3, Hoosac	H. B. Brown,	Florida,		
Tunnel. 15-5,	E. A. White,	Foxborough, .	F. W. Richardson,	6
352-4,	B. P. Winch,	Framingham, .	N. I. Bowditch, .	6
66-12,	Edw. S. Cook,	Franklin,	J. W. Stobbart, .	16
3-12,	Andrew Hathaway, .	Freetown,	G. M. Nichols, .	16
191-М,	G. S. Hodgman,	Gardner,	T. W. Danforth, .	5
	Leander B. Smalley, .	Gay Head,	J. W. Belain, .	8
	Thos. A. Watson,	Georgetown, .	C. J. Eaton, 1	3
	Lewis C. Munn,	Gill,	Henry D. Clark, .	5
448-W,	Herbert J. Worth,	Gloucester, .	H. J. Worth,	2
18-4,	John S. Mollison,	Goshen,		-
	our of Monison,	Golden,	~	

1 Deceased.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	R. E. Bennett,	Gosnold,		-
	Elmer E. Sibley,	Grafton,	C. K. Despeau, .	5
6-4,	G. L. Murray,	Granby,	Chas. N. Rust, .	5
12-11,	Harry A. Root,	Granville,		-
327-W,	D. W. Flynn,	Great Barring-	T. J. Kearin, .	5
439-М,	J. W. Bragg,	ton. Greenfield,	J. W. Bragg,	5
33-24, Enfield, .	Wm. H. Walker,	Greenwich, .	E. A. Sawtelle, .	5
71-5,	Chas. M. Raddin,	Groton,	J. F. Bateman, .	4
2939-М,	Sidney E. Johnson, .	Groveland,	R. B. Larive, .	3
651-33,	Edw. P. West,	Hadley,	Edw. P. West, .	5
5-32, Bryantville,	Geo. A. Estes,	Halifax,	F. D. Lyon,	7
128-M,	Fred Berry,	Hamilton,	E. G. Brewer, .	2
5-14,	Edw. P. Lyons,	Hampden,		_
17-F-2,	Chas. F. Tucker,	Hancock,		-
51-5, Rockland, .	Chas. E. Damon,	Hanover,	L. Russell,	7
12-23, Bryantville,	Geo. T. Moore,	Hanson,	Geo. T. Moore, .	7
2-5,	Henry J. Breen,	Hardwick,	Geo. J. Fay,	5
46-3,	Benj. J. Priest,	Harvard,	G. C. Maynard, .	4
102-12,	John Condon,	Harwich,	Arthur F. Cahoon,	8
72-4,	Fred T. Bardwell,	Hatfield,	Seth W. Kingsley,	5
4-2,	John B. Gordon,	Haverhill,	M. J. Fitzgerald, .	3
6-7, Charlemont,	Herbert A. Holden, .	Hawley,		_
5-18,	S. G. Benson,	Heath,		-
21305 or 500, .	Geo. Cushing,	Hingham,	T. L. Murphy,	7
	A. N. Warren,	Hinsdale,		-
134-W, Randolph,	Melvin L. Coulter,	Holbrook,	Bradford Parks, .	7
42-4,	Winfred H. Stearns, .	Holden,	W. H. Stearns, .	5
5-21, Brimfield, .	Oliver L. Howlett,	Holland,	A. F. Blodgett, .	5
1-2,	W. A. Collins,	Holliston,	Herbert E. Jones,	В
2468-M,	C. J. Haley,	Holyoke,	T. A. Bray,	5
395-R,	W. F. Durgin,	Hopedale,	W. F. Durgin, .	5
Central,	R. I. Frail,	Hopkinton, .	W. A. MacMillan,	5
35-11,	W. L. Lovewell,	Hubbardston, .	Otto Rugg,	5
	Wm. L. Wolcott,	Hudson,	F. P. Hosmer,	4
		Hull,	J. Knowles,	7
4-11,	John J. Kirby,	Huntington, .		-
163-M,	Arthur H. Walton,	Ipswich,	J. A. Morey,	2
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LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
15-3,	Arthur B. Holmes,	Kingston,	R. F. Randall, .	8
261-W,	Nathan F. Washburn, .	Lakeville,	N. F. Washburn, .	7
218-J,	Arthur W. Blood,	Lancaster,	L. R. Griswold, .	4
1295-24,	King D. Keeler,	Lanesborough, .	Geo. H. Judivine,	5
90, ·	Dennis Carey,	Lawrence,	I. B. Kelly,	3
66-3,	Jas. W. Bossidy,	Lee,		1-
37-5,	B. H. Fogwell,	Leicester,	J. H. Woodhead,	5
135,	Oscar R. Hutchinson, .	Lenox,	T. Francis Mackey,	5
546,	Fred A. Russell,	Leominster, .	D. E. Bassett, .	4
9-44, Cooleyville,	O. C. Marvell, :	Leverett,	H. W. Field,	5
480,	Robert Watt,	Lexington,	A. P. Howe,	1
289-11, Greenfield,	Jacob Sauter,	Leyden,	Wm. A. Campbell,	5
44-W,	John J. Kelliher,	Lincoln,	J. J. Kelliher, .	4
17-4,	A. E. Hopkins,	Littleton,	A. E. Hopkins, .	4
6375-J,	Oscar C. Pomeroy,	Longmeadow, .		-
3400,	E. F. Saunders,	Lowell,	J. G. Gordon, .	1
1-12,	H. A. Munsing,	Ludlow,	Ashley N. Bucher,	5
20,	J. S. Gilchrest,	Lunenburg, .	James S. Gilchrest,	4
1174,	Geo. A. Cornet,	Lynn,	G. H. McPhetres, .	2
17-2,	Oscar E. Phillips,	Lynnfield,	L. H. Twiss, .	2
	Watson B. Gould,	Malden,	W. B. Gould, .	1
319-W,	Peter A. Sheahan,	Manchester, .	P. A. Sheahan, .	2
281-W,	Herbert E. King,	Mansfield,	E. Jasper Fisher, .	6
	John T. Adams,	Marblehead, .	W. J. Stevens, .	2
116,	Richard W. Clark,	Marion,	J. Allenach,	8
416 or 151-M, .	Edw. C. Minehan,	Marlborough, .	M. E. Lyons, .	4
43-3,	W. G. Ford,	Marshfield,	P. R. Livermore, .	7
31-2, Cotuit, .	Darius Coombs,	Mashpee,	W. F. Hammond, .	8
13-3,	Frank A. Tinkham, .	Mattapoisett, .	Webster Kinney, .	8
115-4 or 138-3, .	Geo. H. Gutteredge, .	Maynard,	A. Coughlin, .	4
106-4,	W. E. Kingsbury,	Medfield,	G. L. L. Allen, .	16
53 or 138,	C. E. Bacon,	Medford,	W. J. Gannon, .	1
61-2 or 61-3, .	Phineas McNutt,	Medway,	F. Hager,	6
		Melrose,	J. J. McCullough, .	1
188-M,	F. M. Aldrich,	Mendon,	F. M. Aldrich, .	5
21-3,	Edgar P. Sargent,	Merrimac,	C. R. Ford,	3
229 C. F. D., .	Wilbur M. Freeman, .	Methuen,	A. H. Wagland, .	3
		1		

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

		1		
TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
232-W or 232-M, .	W. H. Connor,	Middleborough,	Linam Chute, .	7
1, pay station, .	G. E. Cook,	Middlefield, .		-
63-23,	Oscar H. Sheldon,	Middleton,	B. T. McGlauflin, .	2
65-3,	Elbert M. Crockett, .	Milford,	P. F. Fitzgerald, .	5
30,	Harry L. Snelling,	Millbury,	E. F. Roach,	5
5-2,	Chas. LaCroix,	Millis,	Everett Caldwell, .	6
322,	Nathaniel T. Kidder, .	Milton,	N. T. Kidder, .	7
7-22, Readsbor-	Huel S. Tower,	Monroe,		_
ough. 12-22,	O. E. Bradway,	Monson,	Robert S. Fay,	5
713-22, Greenfield,	Frank B. Gillette,	Montague,	F. H. Gillette,	5
164-25, Great Bar-	Jasper H. Bills,	Monterey,		_
rington. 3-24, Russell, .	Andrew J. Hall,	Montgomery, .		_
17-21, Copoke, N. Y.	Guy W. Patterson,	Mt. Washington,		_
N. Y.		Nahant,	T. Roland,	2
16-5,	Peter M. Hussey,	Nantucket,	C. C. Macy, .	8
244-М,	Bernard Darling,	Natick,	H. S. Hunnewell,	6
195-1,	H. Howard Upham,	Needham,	E. E. Riley, .	6
	Chas. L. Baker,	New Ashford,		_
2280,	Edw. F. Dahill,	New Bedford, .	C. F. Lawton,	8
6-4, Gilbertville, .	Frank A. Morse,	New Braintree, .	E. L. Havens,	5
13-6, Sheffield, .	E. M. Stanton,	New Marlbor-		_
10, Cooleyville, .	Sewell V. King,	ough. New Salem,	R. King,	5
173-5,	W. P. Bailey,	Newbury,	Percy Oliver,	3
380,	Chas. P. Kelley,	Newburyport, .	C. P. Kelley,	13
30, South,	Walter B. Randlett,	Newton,	W. W. Colton,	1
41-5, Franklin,	JasT. Buckley,	Norfolk,	James T. Buckley,	6
265 or 205-W,	H. J. Montgomery, .	North Adams, .	John Martin,	5
1029-Ј,	Wm. L. Smith,	North Andover, .	Fred W. Phelan, .	3
317-2,	Chas. F. Gehrung, .	North Attlebor-	F. P. Toner,	6
63-4,	Oscar C. Hirbour,	ough. North Brookfield,	S. D. Colburn,	5
33-3 or 45,	Henry A. Upton,	North Reading, .	G. E. Eaton,	. 1
165 or 619-W,	F. E. Chase,	Northampton, .	Christopher Clarke,1	5
12-7,	Clarence E. Bailey,	Northborough, .	Lewis H. Smith, .	5
71-5 or 13-3,	W. E. Burnap,	Northbridge, .	A. F. Whitin,	5
2-3,	Fred W. Doane,	Northfield,	F. W. Doane,	5
2911,	Geo. H. Storer,	Norton,	G. H. Storer,	8
27-3,	John Whalon,	Norwell,	J. H. Sparrell, .	7

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	F. W. Talbot,	Norwood,	C. A. Bingham, .	6
119-4,	F. W. Chase,	Oak Bluffs, .	P. P. Hurley, .	8
17-5,	Chas. H. Trowbridge, .	Oakham,	C. H. Trowbridge,	5
232-12,	Wm. Walsh,	Orange,	F. M. Jennison, .	5
33-2,	James Boland,	Orleans,	A. Smith,	8
15,	D. A. Witter,	Otis,		-
9-5,	Olin D. Vickers,	Oxford,	C. G. Larned, .	5
53-3 or 53-12, .	James Summers,	Palmer,	C. H. Keith,	5
159-J, Cedar, .	Fred L. Durgin,	Paxton,	F. L. Durgin, .	5
182-Y,	Michael V. McCarthy, .	Peabody,	J. J. Callahan, .	2
144-3,	Edw. E. Adriance,	Pelham,	Marion E. Richard-	5
7-23, Bryantville,	Jos. J. Shepherd,	Pembroke,	wm. C. Jones, .	7
54-3 or 12-5, .	Geo. G. Tarbell,	Pepperell,	J. Tune,	4
Central,	Dwight T. Raymond, .	Peru,		-
13-2,	Geo. P. Marsh,	Petersham,	Daniel Broderick,	5
176-6, Athol, .	W. H. Cowlbeck,	Phillipston, .	W. H. Cowlbeck, .	5
834 or 535-M, .	Chas. L. Klein,	Pittsfield,		-
33-22, Cumming-	Albert F. Dyer,	Plainfield,		-
ton. 283-J, North At-	R. P. Rhodes,	Plainville,	John W. White, .	6
tleborough.	Ira C. Ward,	Plymouth,	A. A. Raymond, .	8
13-7,	David L. Bricknell, .	Plympton,	D. L. Bricknell, .	8
19-4, Cooleyville,	A. W. Doubleday,	Prescott,	C. M. Pierce,	5
13-4,	F. W. Bryant,	Princeton,	F. A. Skinner, .	5
49-11,	J. H. Barnett,	Provincetown, .	J. M. Burch,	8
1, Quincy,	Faxon T. Billings,	Quincy,	A. J. Stewart, .	7
35-4,	Richard F. Forrest, .	Randolph,	Charles Cole.	7
1284-R,	John V. Festing,	Raynham,	G. M. Leach.	18
518-W.	H. E. McIntire,	Reading,	H. M. Donegan, .	1
11-12,	Benj. F. Monroe,	Rehoboth,	R. E. Anderson, .	6
		Revere	G. P. Babson, .	2
8-2.	Timothy B. Salmon, .	Richmond,		
12-5, North Ro-	Daniel E. Hartley,	Rochester,	John N. Morse.	8
chester. 55-X,	John H. Burke,	Rockland,	F. H. Shaw,	7
28-4,	John C. Martin.	Bockport,	F. A. Babcock,	2
21-6, Charlemont.	Merritt A. Peck.	Rowe,		
3-13,	Daniel O'Brien.	Rowley,	L. R. Bishop, .	3
279-2, Athol, .	Levins G. Forbes,	Royalston,	P. F. Richards, .	5
2.5-2, Aviioi, .	Levius G. Forbes,	Leoyansvon,	1. F. Richards, .	1 3

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
11-3,	S. S. Shurtleff,	Russell,		-
13-3,	Henry Converse,	Rutland,	H. E. Wheeler,	5
		Salem,	Warren P. Hale, .	2
123-21, Newbury-	Jas. H. Pike,	Salisbury,	H. C. Rich,	3
port. 202-12, Winsted,	Arthur L. Strickland, .	Sandisfield, .	- ' -	-
Conn. 43-2, Sagamore, .	Jerome R. Holway, .	Sandwich,	B. F. Dennison, .	8
115,	Chas. L. Davis,	Saugus,	T. E. Berrett, .	2
4-16,	Clinton Tilton,	Savoy,		_
129-3,	E. R. Seaverns,	Scituate,	Lester D. Hobson,	7
399-L-5, Paw-	John L. Baker,	Seekonk,	C.W. Thompson, .	6
tucket. 185-3,	Warren C. Morse,	Sharon,	J. J. Geissler, .	6
26,	Arthur H. Tuttle,	Sheffield,		_
130-2,	Chas. S. Dole,	Shelburne,	Charles S. Dale, .	5
11-М,	Milo F. Campbell,	Sherborn,	J. P. Dowse, .	6
16-21,	A. A. Adams,	Shirley,	A. A. Adams, .	4
48,	E. A. Logan,	Shrewsbury, .	Robert C. Clapp,	5
2-14, Cooleyville,	Nathan J. Hunting, .	Shutesbury, .	E. Colfax Johnson,	5
2632-M, Fall	Wm. F. Griffiths,	Somerset,	C. Riley,	16
River.		Somerville,	A. B. Pritchard, .	1
3164-W,	Louis H. Lamb,	South Hadley, .	C. R. Frye,	5
151-23,	C. S. Olds,	Southampton, .	C. S. Olds, '	5
13, Marlborough,	Harry Burnett,	Southborough, .	H. Burnett, .	5
11,	Aimee Langevin,	Southbridge, .	A. Langevin, .	5
8-2,	B. M. Hastings,	Southwick, .		-
77-4,	A. F. Howlett,	Spencer,	G. Ramer,	- 5
	Chas. S. Taylor,	Springfield, .	J. Alden Davis, .	5
5-12,	J. T. Wilder,	Sterling,	J. H. Kilburn, .	4
	Geo. Schneyer,	Stockbridge, .	Brown Caldwell, .	5
176-3,	Albert J. Smith,	Stoneham,	G. M. Jefts,	1
121-3,	Fred H. Pye,	Stoughton, .	W. P. Kennedy, .	7
166-21, Maynard,	Wm. H. Parker,	Stow,	H. W. Herrick, .	4
6-1,	C. M. Clark,	Sturbridge, .	C. M. Clark, .	5
5-4,	S. W. Hall,	Sudbury,	W. E. Baldwin, .	4
46, South Deer-	A.C. Warner,	Sunderland, .	Richard Graves, .	5
58-32, Millbury, .	Ransom H. Richardson, .	Sutton,	R. H. Richardson,	5
1911-Ј,	Everett P. Mudge,	Swampscott, .	E. P. Mudge, .	2
			1	

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
1-W or 320,	Fred A. Leonard,	Taunton,	L. W. Hodgkins, .	6
30 or 26-5,	C. A. Fletcher,	Templeton, .	J. B. Wheeler, .	5
4249-J, Lowell, .	Harris M. Briggs,	Tewksbury, .	H. M. Briggs, .	1
161-4 or 102-3, .	Elmer C. Chadwick, .	Tisbury,	H. W. McLellan, .	8
269-14, Winsted, .	C. L. Vining,	Tolland,		-
8038,	Chas. W. Floyd,	Topsfield,	C. W. Floyd, .	2
37-2 or 51-2, .	F. J. Piper,	Townsend,	G. E. King,	4
	Walter F. Rich,	Truro,	J. H. Atwood, .	•8
1, Tyngsborough,	Otis L. Wright,	Tyngsborough, .	C. J. Allgrove, .	1
3-6,	Clifford R. Canon,	Tyringham, .		
17-4 or 4-2,	Chas. H. Marshall,	Upton,	G. H. Evans, .	5
51-5,	Lewis F. Rawson,	Uxbridge,	Willard Holbrook,	5
58 or 455-M, .	W. E. Cade,	Wakefield,	W. W. Whittredge,	1
	W. W. Eager,	Wales,	M. C. Royce, .	5
107-2,	Jas. J. Hennessey,	Walpole,	George Kingsbury,	6
6,	Geo. L. Johnson,	Waltham,	W. M. Ryan, .	1
117-13,	Joseph Dupre,	Ware,	F. Zeissig,	5
45-23 and 8004-14,	Dalbert C. Keyes,	Wareham,	J. J. Walsh,	8
	Timothy M. Collins, .	Warren,	A. A. Warriner, .	5
73-3, Orange, .	C. A. Williams,	Warwick,	Chas. E. Stone, .	5
12-4,	Lester G. Heath,	Washington, .		-
116, Newton North.	John C. Ford,	Watertown, .	J. C. Ford,	1
North. 31-3,	Howard C. Haynes, .	Wayland,	D. J. Graham, .	4
101-R,	Ernest L. Wallis,	Webster,	C. Klebart,	5
9 or 359-M,	John P. Doyle,	Wellesley,	F. M. Abbott, .	6
	John Holbrook,	Wellfleet,	E. S. Jacobs, .	8
74-32, Orange, .	Lewis B. Bowen,	Wendell,	G. E. Mills,	5
74, Hamilton, .	J. D. Barnes,	Wenham,	J. E. Kavanaugh,	2
73-3,	Fred E. Clark,	W. Boylston, .	R. K. Parker, .	5
4137,	Warren P. Laughton, .	W. Bridgewater,	O. Belmore,	7
114-3, North	John H. Webb,	W. Brookfield, .	J. H. Webb,	5
Brookfield. 5-2 and 5-6,	Louis H. Flook,	West Newbury, .	Frank D. Bailey, .	3
2067-W,	Dana S. Moore,	W. Springfield, .	Geo. W. Hayden,	5
8016,	Benj. P. Bissell,	W. Stockbridge, .		_
92-3,	Wm. J. Rotch,	West Tisbury, .	H. W. Athearn, .	8
74-2,	Geo. E. Walker,	Westborough, .	Geo. Hayden,	5
111-Y or 111-W, .	T. H. Mahoney,	Westfield,		

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
14-11,	Harry L. Nesmith,	Westford,	H. L. Nesmith, .	1
148-14,	Clayton A. Bartlett, .	Westhampton, .		-
1-3,	Windsor F. Neal,	Westminster, .	G. A. Sargent, .	5
37, Waltham, or	Benj. R. Parker,	Weston,	E. P. Ripley, .	4
1392-M. 14-21,	Frank Whalon,	Westport,	H. A. Sanford, .	18
123-M, Dedham,	Elmer E. Smith,	Westwood,	Martin Sorenson, .	6
154-W,	E. S. Wright,	Weymouth, .	C. L. Merritt, .	7
39-14, South	J. H. Pease,	Whately,	Rylan C. Howes, .	5
Deerfield.	Clarence A. Randall, .	Whitman,	C. A. Randall, .	7
1-4	Henry I. Edson,	Wilbraham, .	F. B. Metcalf,	5
8011-2.	John L. Brown,	Williamsburg, .		_
34-W,	Wm. H. Davies,	Williamstown, .	Wm. Davies,	5
28-2	Oliver McGrane,	Wilmington, .	O. McGrane,	1
29 or 190,	Arlon D. Bailey,	Winchendon, .	G. W. Drury,	5
123-2 or 39-W,	David H. DeCourcy, .	Winchester, .	S. S. Symmes,	1
201-12,	Amos S. Ferry,	Windsor,		_
		Winthrop,	M. F. Smith, Jr.,	2
110,	Frank E. Tracv	Woburn,	H. B. Mackay.	1
3064-M, Park, .	Arthur V. Parker,	Worcester,	H. J. Neale, .	5
10-22,	Chas. A. Kilbourn,	Worthington, .		_
23-5	Geo. H. E. Mayshaw,	Wrentham,	W. Gilmore	6
53-33, Barnstable,	Jos. W. Hamblin,	Yarmouth	C. R. Bassett,	8

OFFICE WORK.

Perhaps it would not be out of place to say a few words here about the work of our office as it touches the general public.

Much time and conscientious work are spent in giving advice to any one who seeks it in regard to forest planting, thinning, forest insects and tree diseases.

Hundreds of insects are brought to this office for identification during the year, and information concerning their habits given and remedial measures recommended. Town officials are always welcome, and consultations in regard to local problems, local superintendents and their work, forest wardens and other matters are readily granted. The explanation of the various complicated laws under which we work — forest taxation law, reforestation, gypsy-moth suppression, forest fire prevention — is often necessary, and is courteously and fully made.

We receive throughout the year many hundreds of applications for work, and although our work does not enable us to employ directly many persons, we often place them in towns or cities, with contractors in private thinning jobs, or on the North Shore.

The adjusting of town accounts by the bookkeeper is an important part of our work, and the office is always glad of an opportunity to compare our accounts with those of town treasurers, selectmen or local superintendents.

We are always glad to recommend literature to those desiring information regarding forestry matters, or we send such publications as we have free of charge.

We send out many circular letters of information to our division superintendents, forest wardens and town officials. We look up all complaints of individuals in regard to work that is poorly done by town officials or contractors, and inspect work done by contractors, if desired.

STATE FORESTER'S TRAVEL.

The activities of the State Forester during the year are probably far greater than most people realize. Besides the regular routine of his office, which necessarily demands constant attention, the forester has to travel from one end of the State to the other many times during the year.

Travel by automobile is the most satisfactory way, as it enables one to visit even remote and comparatively inaccessible places that a few years ago would have been difficult to see. It has not been uncommon for the forester to travel from 100 to 200 miles a day with his division men, and meanwhile examine the work in progress in many towns and cities. Travel by automobile alone approximated 15,000 miles during the year.

But few trips have been outside the State this year. The principal one was to attend the meeting of the Association of Eastern Foresters, which was held at Mont Alto, Pa., at the Pennsylvania Forestry Academy. The State of Pennsylvania has over 1,000,000 acres set aside as State forests, and these

forests are superintended and managed by the graduates of their own forest academy. Each graduate is required to devote three years following his graduation to the State's employ, for which he is paid a definite amount.

Each of these State forests has its particular problem to solve, and a comparison of results due to local markets, shipping facilities, etc., proved interesting. Visits like this are educational, as they offer splendid comparisons of undertakings in forestry under radically different conditions. Practical operations and methods pursued were discussed by the various foresters present.

Last February the State Forester was invited to take part in the dedication of the new forestry building at the Ohio State University at Columbus, O., at which time he gave an address on the subject, "Evolution of American Forestry." This is published elsewhere in the report.

Trips to Keene, N. H., and Peterboro, N. H., where forestry was discussed before good-sized audiences, were made during the year.

OBITUARIES.

Governors Guild and Rollins.

The State Forester bespeaks the privilege of calling to the attention of those who are lovers of trees and forests the great loss to Massachusetts, and New England in general, by the hand of death during the present year, of two of our Ex-Governors who have been closely identified with forestry development. These men were Governor Curtis Guild of Massachusetts and Governor Frank W. Rollins of New Hampshire. Due to his connection with the New Hampshire College, the writer was closely identified with the latter when he was Governor of New Hampshire. He was appointed to his present position in 1906 by Governor Guild, through whose personal interest the Massachusetts work was so rapidly advanced.

Governor Guild was elected president of the American Forestry Association, which office he held for two terms. Governor Rollins was president of the Society for the Protection of New Hampshire Forests from its inception, I believe, until his death. He was also chairman of the forestry committee of the Boston Chamber of Commerce for a number of years.



Removing wild cherry trees along the highway, Marshfield. These trees are stripped annually by the tent caterpillars and should be repiaced by some trees that are better adapted to roadside planting.



A country roadside in Hingham where the food of the gypsy and brown-tail moths has been cut out. The remaining trees being evergreen need no future treatment, and hence this thinning is a great saving to the town.



Both Governors were powerful factors in aiding in the enacting by Congress of the Weeks bill, which has enabled us to establish national reserves in the White Mountains and in the southern Appalachian Mountains.

Truly these men may properly be designated as the forestry and conservation Governors of their respective States of Massachusetts and New Hampshire.

The writer considers it was indeed a privilege and inspiration to have been associated with these men, who were not only lovers of forestry and nature but of their fellow men, and examples of the true statesmen of our beloved country.

RELIEF FOR THE UNEMPLOYED.

The late winter months of 1914 found many thousands of Massachusetts citizens without employment, and as the season advanced conditions did not improve, and later grew worse. Responsibility for this unfortunate condition was ascribed to many causes that need not be discussed here. By the time the Legislature convened in January the situation had become so acute as to arouse to action many philanthropic citizens and societies, and Governor Walsh, in opening his inaugural address to the Legislature, referred to the gravity of the situation in these words: "Unemployment, with its inevitable concomitants of suffering and crime, has risen above the normal level. First of all, I earnestly ask your immediate action to solve, as far as a solution is within our power, the pressing problem of the unemployed." In response to this urgent appeal of His Excellency for remedial legislation the committee of agriculture promptly reported the following resolve, which was with the utmost expedition passed by both branches of the General Court, and was approved by the Governor on Feb. 9, 1915: -

Resolved, That the state forester be directed to provide employment for needy persons deemed by him to be worthy thereof, preference being given to residents of the commonwealth and to persons who have others dependent upon them for support. The moneys authorized to be spent under the provisions of this resolve shall be spent upon the improvement and protection of forests and in any other public work which may in the opinion of the state forester be proper. There shall be allowed and paid

out of the treasury of the commonwealth for this purpose the sum of twenty-five thousand dollars, together with any unexpended balances of the amounts appropriated to be used under the provisions of chapter seven hundred and fifty-nine of the acts of the year nineteen hundred and thirteen and chapter five hundred and ninety-six of the acts of the year nineteen hundred and fourteen. For the purpose of carrying out the provisions of this resolve, the state forester may appoint his duly accredited agents as special police officers to serve for such period as may be determined by him and subject to removal by him. Such officers shall serve without pay, except their regular compensation as agents or employees of the state forester, and shall receive no fees for services or return of criminal process. They shall have, throughout the commonwealth, the powers of constables and police officers to arrest and detain any person violating the law of the commonwealth, but they shall not have power to serve any process in civil cases. The civil service laws and the rules and regulations made thereunder shall not apply to this resolve or to any action taken hereunder.

It is believed that this is the first instance where a State has endeavored by legislation to solve an economic problem of this character.

The nature of the work with which this department is charged, such as moth suppression, forest fire prevention and the various branches of forestry endeavor, enabled the department to begin operations immediately, and several hundred men were given employment in moth-suppression and forestry work. While the resolve gave to the State Forester the authority to appoint special police officers as a safeguard against possible trouble of any nature, he did not exercise this right, the organization of the field force of the department being sufficient to make such a course unnecessary. In fact, the knowledge and efficiency of the State Forester's agents and assistants, together with the plan of co-operation entered into between the officials of cities and towns and the department, made it possible to apply practically the entire appropriation to labor, without any overhead charges.

In the discharge of the duty imposed upon him by the resolve the State Forester not only endeavored to carry into effect the real spirit, and purpose of the Legislature, — the employment of needy persons, — but applied the funds to the promotion of such branches of the forest service of the Com-

monwealth as would in his opinion be of the greatest and most permanent benefit to the State. The work accomplished, both in amount and quality, far exceeded his expectations. Cooperating with the Massachusetts committee to promote work, arrangements were made with the local committees in most of the cities and towns insuring the employment of those needy persons most worthy to become beneficiaries under the legislation, and in a majority of the cities and towns it was left with the overseers of the poor to determine those who should be selected for work, as in the discharge of their duties as officials they were enabled to have a much more intimate knowledge of local conditions than could any one else.

It was the aim of the State Forester to distribute the funds as equitably as possible among the various cities and towns, and in those cities and towns where there was insufficient moth and forestry work to be done to meet the demands of the unemployed situation men were transferred to other cities and towns. This plan was followed in the case of Clinton, Weymouth, Natick, Framingham, Quincy and many other places, and worked out perfectly satisfactorily.

The work carried on under this special legislation had progressed but a few weeks when its value as a relief measure obtained general recognition, and the Governor in a special message to the Legislature earnestly recommended that an extra appropriation of \$50,000 be made available for the use of the State Forester, in order that the work might be continued until such time in the spring as the demand for labor in agricultural and other outdoor pursuits would result in reducing the tension of the unemployed problem. The text of the message is as follows:—

I have received from the State Forester a report of the doings of his department in connection with the expenditure of the special appropriation of \$50,000 entrusted to him by chapter 2 of the resolves of the present year. He states that the appropriation, supplemented by certain sums received from municipalities and private citizens in payment for work done, has enabled him to give work to some 1,200 persons who otherwise would have been without employment, and that their services have been satisfactory beyond his expectation.

The appropriation will be exhausted, at the present rate of expenditure, in about three weeks, while the end of the need for special provisions for relief of unemployment is not yet in sight.

I recommend, therefore, that an additional appropriation of \$50,000 be placed at the State Forester's disposal, to be expended by him in providing employment for needy persons in accordance with the terms of the original resolve.

The Legislature, acting promptly on the suggestion contained in the message, passed a resolve authorizing the expenditure of \$50,000, said sum to be in addition to any amounts previously authorized, and this resolve was approved by the Governor March 19, 1915. After several conferences with representatives of the committee on the unemployed, appointed by the Governor, the State Forester induced many woodland owners to undertake forest-thinning operations, which resulted in the vast improvement of between 1,000 and 2,000 acres of forest land, the cost of such work being divided between the owner and the State. The activity of the division moth superintendents in arousing the interest of property owners in this character of work was very commendable, and much appreciated by the State Forester. The amount of money received from private individuals was about \$15,000, and this allowed the continuance of the relief of the unemployed several weeks longer than would otherwise have been possible.

The State Forester desires to express his grateful appreciation of the cordial spirit of co-operation shown by the various cities and towns, which was manifested in many ways. Many towns and cities, and in some instances individuals, furnished without cost the transportation of men to and from work where long distances made such transportation necessary.

STATEMENT SHOWING AGGREGATE NUMBER OF MEN EMPLOYED EACH WEEK AND COST OF PAY ROLLS.

				V	VEEK	END	ING -	-					Number of Men.	Amount of Pay Rolls.
Feb.	13,												101	\$477 10
	18,												553	3,110 70
_	25,												1,254	6,605 96
Mar.	4,												1,422	10,181 0
	11,										•		1,356	10,102 20
	18,			•	•	•			•	•	•		1,297	9,263 39
	25,			•	•	•	•		•	•	•		1,220	9,081 62
pr.	1,				•	•			•		•	•	1,313	9,587 02 8,470 00
	8,					•		•	•	•	•		1,348 1,432	
	15, 22,		•		•	•			•	•		•	1,315	10,745 63 9,379 33
	29,	•			•		•	•	•	•	•		1,114	8,406 30
fav	6.	•	•	•	•	•	•	•	•	•	•	. 1	961	5,241 6
шу	14.	•	•	•	•	•	•		•	•	•	. 1	317	2,346 43
	21.				•	•			•	•	•	.	264	2,052 9
	28,		•	•	•	•	•	•	•	•	•	•	209	1,434 7
une	3,	•	•	•	•	•	•	•	•	•	•	. 1	153	1,027 5
шц	10.	•	•	•	•	•	•	•	•	•	•	•	100	783 2
	17,	•	•	•	•	•		•		•	•	•	104	822 0
	24,	•	•	•	•	•	•		•	•	•		67	482 2
uly	2,	•	•	•	•	•		•	•	•	•		5	43 00
uly	9,	•	•						•		•		22	148 70
	16.												6	73 0
	23.								- :	i.			3	42 00
	30.												13	240 1
ug.	7.											1	I	15 0
-6.	14.	1			i.							. 1	10	151 7
	21,												8	102 8
	28,											. 1	4	76 0
ept.	4.											. 1	4 2 2	18 4
•	11.											. 1		13 4
	16,												12	41 8
ct.	23,												11	129 3
	30,												5	37 4
lov.	6,												3	29 8
	13,												19	179 9
	20,												48	415 2
	27,												73	513 7
lisce	llane	ous,												22 2
														\$111,912 5

TABLE SHOWING WORK DONE BY UNEMPLOYED IN DETAIL.

		Maximum Number of Men employed.	Number of Miles of Roadside cleared.	Number of Acres of Woodland thinned.	Acres of Brush burned.	Brushing and Plant- ing (Acres).	Cords of Wood cut.	Work.		Amount expended.
Acton,		. 8	3	-	5	-	-	Gypsy moth,		\$333 08
Amesbury,	•	. 3	2	-	-	-	-	Gypsy moth,	•	128 40
Amherst,		. 9	-	-	-	-	-	Fire work,		299 20
Andover,	•	. 28	7	8	-	-	-	Gypsy moth,		2,536 36
Ashburnham, .	٠	. 6	5	-	-	-	-	Gypsy moth,		515 90
Whitney lot, .		. 9	-	-	-	65	-	Reforestation, .		456 37
Athol,		. 27	-	-	-	-	-	Fire work,		300 00
Attleboro,		. 20	-	-	-	-	-	Gypsy moth,		999 00
Brochu lot, .		. -	-	-	-	25	-	Reforestation, .		347 38
Auburn,		. 7	10	-	- 1	-	-	Fire work,		100 00
Ayer,		. 5	21/2	-	-	2	-	Gypsy moth, .		223 35
Barnstable,		. 22	15	-	-	-	-	Gypsy moth	and	2,065 41
Bedford,		. 4	41/2	-	8	-	12	creosoting. Gypsy moth,		344 93
Belchertown, .	• .	. 10	-	-	-	-	-	Fire work, .		192 40
Berlin,		. 20	3	2	-	-	-	Gypsy moth, .		193 53
Billerica,		. 5	10	-	10	-	-	Gypsy moth, .		494 70
Bolton,		. 22	7	-	-	_	-	Gypsy moth, .		592 87
Boston (tuberculosis	hospi	- 10	-	-	-	-	-	Gypsy moth, .		625 50
Bourne,		. 7	7	-	-	-	-	Gypsy moth	and	503 00
Boxborough, .		. 7	11/2	-	_	-	-	creosoting. Gypsy moth, .		342 47
Boxford,		. 5	6	-		-	_	Gypsy moth, .		432 85
Boylston,		. 6	6/10		-	_	25	Gypsy moth, .		178 80
Braintree,		. 20	-	60	-	-	200	Gypsy moth, .		781 30
Bridgewater, .		. 6	-	5	' <u>-</u> ,	3	_	Gypsy moth, .		267 05
Brockton,		100	2	12	_	_	75	Gypsy moth, .		1,812 50
Burlington,		. 3	5	_	-	_	_	Gypsy moth		208 10
Carlisle,		. 2	6	-	10	-	_	Gypsy moth, .		191 20
Carver,		. 12	41/2	55	_	_	127	Gypsy moth	and	980 05
Chelmsford, .		. 5	7	_	15	_	251/2	creosoting. Gypsy moth,		393 85
Chester,		4	_	_	-	-	_	Fire work, .		201 00
Chicopee,		30			_	_	_	Fire work.		1,043 20
Danvers,		. 6	5	_	_	_	_	Gypsy moth, .		467 20
Dracut,	. / .	-	8	_	8	_	-	Gypsy moth, .		517 50
		,								

TABLE SHOWING WORK DONE BY UNEMPLOYED IN DETAIL — Con.

	Maximum Number of Men employed.	Number of Miles of Roadside cleared.	Number of Acres of Woodland thinned	Acres of Brush burned.	Brushing and Plant- ing (Acres).	Cords of Wood cut.	Work.	Amount expended.
Dudley,	 6	10	_	_	_	_	Fire work,	\$200 00
Duxbury,	 5	8/4	-	_	_	10	Gypsy moth,	157 00
Easthampton, .	 27	-	-	-	-	-	Fire work,	288 20
Falmouth,	 7	-	3	-	-	H	Gypsy moth, creosot-	654 40
Fall River,	 32	-	-	-	- '	H	ing and inspection. Gypsy moth, fire	4,466 90
Fitchburg,	 30	20	-	-	-	-	lines, road building. Gypsy moth,	2,105 90
Forest fire work, 1	 -	-	-	-	-	-	Fire work,	923 40
Framingham, .	 20	-	30	-	-	-	Gypsy moth,	1,745 20
Gardner,	 8	-	-	-	-	-	Fire work,	200 00
Greenwood lot,	 -	-	-	-	85	-	Reforestation,	454 80
Georgetown, .	 5	11/2	7	-	-	-	Gypsy moth,	476 00
Gloucester,	 10	-	19	-	-	-	Gypsy moth,	485 60
Grafton,	 10	-	-	-	-	-	Fire work,	480 35
Great Barrington,	 11	3	-	-	-	- 1	Fire work,	250 00
Greenfield,	 7	10	2	-	-	-	Fire work,	540 80
Groton,	 10	9	-	-	-	- 1	Gypsy moth,	752 40
Groveland,	 5	4	-	-	-	-	Gypsy moth,	377 20
Hadley,	 8	10	-	-	-	-	Fire work and 2 acres	306 65
Halifax,	 2	-	-	-		-	roadside planted. Fire work,	108 50
Hamilton,	 10	-	20	-	-	-	Gypsy moth,	1,018 48
Hanover,	 5	10	-	-	-	-	Gypsy moth,	161 20
Hanson,	 5	13/4	-	-	-	10	Gypsy moth,	176 35
Harvard,	 6	1/2	-	-		-	Gypsy moth,	164 05
Haverhill,	 8	71/2	-	-	-	-	Gypsy moth,	1,047 40
Hingham,	 10	-	25	-	-	50	Gypsy moth,	382 75
Holyoke,	 -	-	-	-	50	-)	2.	000 00
Water board, .	 22	- 1	-	-	-	-}	Reforestation,	980 00
Hopkinton,	 9	~	-	-	40	-	Reforestation,	952 19
Hubbardston, .	 -	-	-	40	-	-)	Defendation	206 60
Morgan lot, .	 5	-	-	-	-	-}	Reforestation,	326 60
Hudson, '	 20	10	70	-	10	-	Reforestation and	1,591 91
Ipswich,	 4	61/2		-	-	-	gypsy moth. Gypsy moth,	259 80
	1		1	1	1	1		

¹ Telephone and fire lines.

TABLE SHOWING WORK DONE BY UNEMPLOYED IN DETAIL - Con.

		_		Levi	1					
			Maximum Number of Men employed.	Number of Miles of Roadside cleared.	Number of Acres of Woodland thinned	Acres of Brush burned.	Brushing and Plant- ing (Acres).	Cords of Wood cut.	Work.	Amount expended.
Kingston,		•	7	21/4	2	-	38	-}	Reforestation and	9 000 04
Holmes lot, .	•	٠	-	-	-	-	15	- 1	gypsy moth, .	\$933 84
Lancaster,	•	٠	9	-	-	-	-	-}	Reforestation,	1,718 33
Blood lot,	٠	•	-	-	-	-	15	- J		-,,,,,,
Leicester,	•		8	-	-	-	-	-	Fire work,	191 60
Leominster,	•	٠	9	6	-	-	-	-	Gypsy moth,	568 30
Lexington,			6	4	-	15	-	-	Gypsy moth,	511 17
Lowell,			22	3	-,	120	-	1471/2	Gypsy moth,	1,784 50
Ludlow,			9	15	-	-	-	-	Fire work,	236 80
Lunenburg,			10	9	-	-	-	-	Gypsy moth,	344 75
Lynn,			20	-	400	-	-	-	Gypsy moth,	1,801 20
Lynnfield,			4	-	14	-	-	-	Gypsy moth,	400 40
Marblehead, .			3	6	-	-	-	-	Gypsy moth,	224 00
Marlborough, .			40	10	- 1	100	6	-)	Reforestation and	
Brown lot, .			~	-	-	-	70	-}	gypsy moth, .	3,455 28
Marshfield,			8	3	-		-	-	Gypsy moth,	148 40
Mashpee,			10	53/4	33½	-	-	34	Gypsy moth,	821 58
Methuen,			7	4	-	-	-	-	Gypsy moth,	661 60
Middleborough, .			25	33/4	-	-	_	100	Gypsy moth,	834 10
Middleborough, .			4	-	_	_	_	_	Forest fire,	146 00
Middleton,			3	-	91/2	_	_	_	Gypsy moth,	259 60
Milford,			13	-	- 1	_	_	_	Fire work,	349 00
Millbury,	. •		7	_	_	_	-	_	Fire work,	100 00
Monson,			8	_	_	_	_	_	Fire work,	204 80
Montague,			12	_	_	_	_	_	Fire work,	149 60
Mount Washington,			5	-	_	_	_	_	Fire work,	295 20
Natick,			50	- 1	80	_	_	_	Gypsy moth,	2,350 80
Needham,			20	_	35	_	_	_	Gypsy moth,	1,150 80
New Bedford, .			28	_	_	_	_	_	Gypsy moth,	1,883 20
Newbury,			5	_	25	25	_	_	Gypsy moth,	561 20
Newburyport, .			10	4	_	_	_	_	Gypsy moth,	1,036 00
North Andover, .			5	41/2	_	_	_	_	Gypsy moth,	646 20
North Attleborough,			26	_	_	_	_	_	Gypsy moth,	1,253 90
54)		_			1		1		О ДОЗ ПООЦ,	

TABLE SHOWING WORK DONE BY UNEMPLOYED IN DETAIL — Con.

			-					
	Maximum Number of Men employed.	Number of Miles of Roadside cleared.	Number of Acres of Woodland thinned.	Acres of Brush burned.	Brushing and Plant- ing (Acres).	Cords of Wood cut.	Work.	Amount expended.
North Brookfield,	11	_	-	_	_	_	Fire work and refor-	\$411 55
North Reading,	3	3	_	8	_	-	estation. Gypsy moth,	344 80
North Shore work (Beverly,	82	81/4	25	-1	-		Gypsy moth,	5,525 40
Essex and Manchester). Northborough,	22	10	-1	1/2	-	170	Gypsy moth,	1,304 90
Norwell,	5	1/4	-	-		20	Gypsy moth,	64 10
Norwood,	25	H	60	-	-	-	Gypsy moth,	1,703 80
Orange,	28	20	Ы	-	-	-	Fire work,	599 20
Oxford,	8	12	- 1	-	-	-	Fire work,	294 40
Palmer,	10	13	-	-		-	Fire work,	400 00
Peabody,	10	1	241/4	-	-	-	Gypsy moth,	861 90
Pembroke,	11	1/2	15	-	-	23	Gypsy moth,	420 20
Pepperell,	10	61/2	-	-	-	H	Gypsy moth,	1,038 10
Pittsfield,	18		-	- 1	-	-	Fire work,	307 20
Plymouth,	20	В	-	- 1	-	ы	Gypsy moth,	1,607 80
Plympton,	10	21/2	21/2	-	-	461/2	Gypsy moth,	981 50
Princeton,	7	31/2	-	-	-	# 5	Gypsy moth,	434 40
Reading,	2	9	-	35	-	-	Gypsy moth,	678 80
Rehoboth,	6	-	-	-	-	-	Fire work,	110 00
Rockport,	3	4	-	-		-	Gypsy moth,	247 40
Salem,,	10	-	18	-	-	-	Gypsy moth,	852 00
Salisbury,	4	2	6	3	-	-	Gypsy moth,	373 60
Sandwich,	5	-	2	В	-	-	Creosoting and gypsy moth.	422 20
Saugus,	6	-	12	-	-	-	Gypsy moth,	523 20
Scituate,	5	2	-	- 1	-	-	Gypsy moth,	199 81
Sheffield,	5	-	-	-		-	Fire work,	176 40
Shelburne Falls,	2	-	-	-	-	-	Fire work,	69 60
Shrewsbury,	9	41/10	-	-	-	45	Gypsy moth,	389 20
Spencer,	B	9	-	-	-	-	Reforestation,	995 46
Springfield,	31	-	-	-	-	-	Fire work,	817 60
Sterling,	16	14	-	- 1	-	-	Gypsy moth,	1,440 43
Stoughton,	20		12	-	-	261/2	Gypsy moth,	401 20
Stow,	6	1	-	-	-	-	Gypsy moth,	156 65

TABLE SHOWING WORK DONE BY UNEMPLOYED IN DETAIL - Con.

TABLE SE		WING		Olik	. 20.	1111			11 20	TED IN DETAIL	
				Maximum Number of Men employed.	Number of Miles of Roadside cleared.	Number of Acres of Woodland thinned.	Acres of Brush burned.	Brushing and Plant- ing (Acres).	Cords of Wood cut.	Work.	Amount expended.
Sudbury, .				5	1/2	-	-	-	-	Gypsy moth,	\$143 65
Sutton, .				8	9	-	-	-	-	Fire work,	349 00
Swampscott,				4	-	20	-	-	-	Gypsy moth,	288 80
Taunton, .				24	_	-	_	-	-	Gypsy moth,	999 65
Templeton, .				9		-	-	-	-	Fire work,	200 00
Tewksbury, .				5	3	-	15	-	641/2	Gypsy moth,	552 62
Tolland, .				5	-		_	-	-	Fire work,	134 40
Topsfield, .				3	1/4	8	_	-	_	Gypsy moth,	250 60
Townsend, .				8	5	_	_	-	_	Gypsy moth,	291 10
_									1	Gypsy moth,	
Truro,	• 1	•	۰	2	-	-	-	-	-{	Burning brush,	16 00
Tyngsborough,				5	6	_	15	-	_ `	Gypsy moth, .	774 05
Uxbridge, .				12	6	-	_	-	-	Fire work,	190 50
Wales,				9	27	5	_	_	-	Fire work,	294 80
Walpole, .				20	-	80	-	_	-	Gypsy moth,	2,482 90
Wareham, .				5	_	_	_	_	_	Creosoting and gypsy	431 20
Warren, .				8	20	_	_	_	_	moth. Fire work,	150 00
Warwick, .				14	_	_	_	_	_	Fire work,	301 85
Wayland, .				16	1	25	_		_	Gypsy moth,	966 04
Webster, .				36	_	_	_	_	_	Fire work,	250 00
Wenham, .				5	_	15	_	_	_	Gypsy moth,	393 80
West Bridgewate	r,			5	1	_	_	_	20	Gypsy moth,	196 20
West Newbury,				5	31/2	_	_	_	_	Gypsy moth,	367 45
Westborough,				5	2	_	_	_	8	Gypsy moth,	140 20
Highway, .				10	12	_	-	_	-1		
Tower, .				5	_	_	_	_	_}	Fire work,	713 05
Westfield, .				11	12	_	_	_		Fire work,	327 00
Westford, .				5	3	_	10	_	11/2	Gypsy moth,	381 90
Westminster,				5	31/5	_	_	_	37	Gypsy moth, .	549 80
Fenno lot,				-	_	_	_	120	_	Gypsy moth,	418 60
Westwood, .				20	_	50	_	_	_	Gypsy moth,	1,183 50
Weymouth,				35	_	60	_	_	200	Gypsy moth,	1,504 20
Williamstown,				6	_	_	_	_	-	Fire work,	249 60
Wilmington,				2	6	_	20	_	35	Gypsy moth,	715 70
			_		1			I	-		,

¹ One mile fire line, 12 miles telephone line.

TABLE SHOWING WORK DONE BY UNEMPLOYED IN DETAIL - Con.

		Maximum Number of Men employed.	Number of Miles of Roadside cleared.	Number of Acres of Woodland thinned.	Acres of Brush burned	Brushing and Plant- ing (Aores).	Cords of Wood cut.	Work.	Amount expended.	
Winchendon, .		20	22	-	-	-	-	Gypsy moth,	. } \$1,191	75
State forest, .		-	-			75	-	Reforestation,		
Winchester,		7	-		-	-	-	Gypsy moth,	36	30
Worcester,		112	21/2	53		-	170	Gypsy moth,	3,009	00
Total number of mi Total number of acr Total number of acr Total number of acr Total number of cor	res of woo res of bru res brushe	dland sh bur ed and	thing ned, plan	d, ned,	MMAR	· · · · · · · · · · · · · · · · · · ·			1,48	31/2
			REL	IEF	OF T	THE		MPLOYED.		
Appropriation 1			01.		•			\$25,000 00		
Balance from			914	(cha	pter	12'	7,	04 545 55		
Resolves of 1					•	٠	•	24,547 55		
Appropriation	of M	arch	19	(cl	napte	er :	2,			
D 1 C1	015)							70 000 00		
Resolves of 1	915), .				•	•	• _	50,000 00	\$99.547	55
Resolves of 1		Iontri	hutů	ons 1	e N	• ovem	her s		\$99,547	55
		'ontri	buti	ons t	eo No	• ovem	ber s	30.	\$99,547	55
Attleboro, .		ontri	buti	ons t	o No	• ovem	ber s	30. \$500 00	\$99,547	55
Attleboro, . Barnstable, .		ontri	buti	ons t	to No	ovem	ber S	30.	\$99,547	55
Attleboro, . Barnstable, . Belchertown,		ontri	buti	ons t		ovem	ber s	\$60. \$500 00 52 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, .		ontri	buti	ons t	to No	ovem	ber s	\$500 00 \$500 00 52 00 150 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, .		ontri	buti	ons t	. to No	ovem	ber 3	\$30. \$500 00 52 00 150 00 30 50	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, .		ontri	buti	ons t		• ovem	ber &	\$0. \$500 00 52 00 150 00 30 50 390 50	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, .		ontri	buti	ons t		ovem	ber 3	\$0. \$500 00 52 00 150 00 30 50 390 50 500 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, .		'ontri	butio	ons t			ber &	\$500 00 \$500 00 \$52 00 150 00 30 50 390 50 500 00 109 84 400 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, .		ontri	butio	ons t		ovem	ber 3	\$500 00 \$500 00 \$52 00 150 00 30 50 390 50 500 00 109 84	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton,		ontri	bution	ons t		ovem	ber	\$0. \$500 00 \$2 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00 250 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, .			butio	ons t		·		\$500 00 \$500 00 \$52 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, . Framingham,		·	butio	ons t				\$0. \$500 00 \$2 00 \$150 00 \$30 50 \$390 50 \$500 00 \$109 84 \$400 00 \$300 00 \$250 00 \$1,500 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, . Framingham, Georgetown,			buti	ons t		ovem		\$0. \$500 00 52 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00 250 00 1,500 00 239 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, . Framingham, Georgetown, Grafton, .			buti	ons t		ovem		\$0. \$500 00 52 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00 250 00 1,500 00 239 00 67 20	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, . Framingham, Georgetown, Grafton, . Greenfield, .			buti	ons t			ber 8	\$0. \$500 00 52 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00 250 00 1,500 00 239 00 67 20 200 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, . Framingham, Georgetown, Grafton, . Greenfield, . Hadley, .			butio	ons t			ber 8	\$0. \$500 00 52 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00 250 00 1,500 00 239 00 67 20 200 00 100 00 150 00	\$99,547	55
Attleboro, . Barnstable, . Belchertown, Beverly, . Braintree, . Brockton, . Carver, . Chicopee, . Dedham, . Easthampton, Fall River, . Framingham, Georgetown, Grafton, . Greenfield, .			butio	ons t			ber 8	\$0. \$500 00 52 00 150 00 30 50 390 50 500 00 109 84 400 00 300 00 250 00 1,500 00 239 00 67 20 200 00 100 00	\$99,547	55

Amount	s bro	nugh	t for	rward,					. \$5,164	04	\$99,547	55
Hingham,								,.	50	00		
Hudson,					Ċ					00		
Kingston,										22		
Lowell, .					Ĭ.			Ĭ		75		
Lynnfield,								Ī		50		
Mashpee,										90		
Marlborough										00		
Prendergast								•		80		
Middleborou							•	•		75		
Natick, .				:		•	•	٠,٠		50		
Needham,						•	•	•		00		
New Bedfore					٠		•	•		90		
37 1					•	•	•	•		29		
		· ·	•	•	٠	•	•	•				
North Attlel					٠	•	•	•		98		
North Shore					•	٠	•	٠	2,386			
Norwood,		٠.	٠	•	•		•	•	271			
Orange,	•	•	٠	•	•	•	•	•		00		
Palmer,	•	•	٠	•	•	•	•		100			
Pembroke,	•	•	٠	•	٠	•	•			60		
Plymouth,			•	•				٠	27	34		
									57	50		
Shrewsbury,									30	20		
Spencer,			۰						207	62		
Stoughton,									11	50		
Sudbury,									9	75		
Sutton, .									150	00		
Taunton,			٠						840	50		
Tewksbury,									104	75		
Topsfield,									2	50		
YY7-1					1				150			
TT7 - 1 1 -								Ť	1,256			
337 1								•		00		
TT7 • 1			•			•		•	. 150			
Wenham,		٠.						•	100			
Wilmington,						•	•	•		00		
***************************************		•	•	•	•	•	•	•			14,436	07
											11,100	-
											\$113,983	62
					Exp	pendi	tures					
Pay roll,									\$111,912	54		
Supplies,									1,106			
Rent, .	0							Ů	10			
Stationery ar	nd po	osta	ge.						50			
Ct 1 .								•	70			
					•	•	•	•			113,148	92
Balance	retu	rned	l to	treas	ury,						\$834	70

PRIVATE CO-OPERATIVE FORESTRY WORK.

Every year we receive numerous requests for advice on the treatment of existing woodlands and the reforestation of cutover and waste lands from private owners. Nearly all such inquirers are advised to have these lands examined by one of the foresters from this office, in order that the advice may be given after a personal inspection of the property. Nearly every piece of woodland has characteristics peculiar to itself, and any form of general advice given through correspondence or in the office is at best unsatisfactory. During the past two years applications for examinations lying within the area heavily infested by the gypsy moth have been referred to Mr. Kneeland, forester for the moth department, and a compilation of the examinations made by him or his assistants will be found in another section of this report. Forty-five examinations, covering about 4,500 acres, have been made during the past year by the forestry branch of the State Forester's office.

On occasions we have gone further than simply giving advice, and actually superintended the work which we advised the owner to do. Owing to the fact that Mr. Haynes, who has in the past been doing most of this work, has been engaged by the State Forest Commission in making investigations and surveys for them during the greater part of the year, we have done less than usual of this operating work. Several tracts on which work was commenced last fall, and which were mentioned in the report of last year, were finished during the winter or spring. These tracts belonged to St. Augustine's Farm, Foxborough; Alfred Mellor, Cummington; Mrs. W. P. Crocker, Foxborough; Boylston Manufacturing Company, Holden; W. B. Cross, Brockton and Hanson; B. I. Gilman, Wrentham. The work on these lands consisted chiefly of thinning and brush clearing, and covered a total area of around 500 acres. During this winter we are brush clearing and thinning on a tract of 40 acres belonging to Mr. F. C. Haskins in Norwell.

LIST OF FOREST EXAMINATIONS.

THE STATE FORESTER.

		1	
NAME.	Town.	Area (Acres).	Problem.
Oliver Ames,	North Easton, .	50	Chestnut blight.
Geo. M. Baker,	Concord,	20	Estimate.
W. A. Balch,	Dorchester, .	-1	Insect damage.
Edward Bell,	Southampton, .	200	Chestnut blight.
C. S. Bird,	Walpole,	40	Thinnings.
C. B. Bliss,	Warren,	300	Chestnut blight.
Consumptives' Hospital, Boston,	Boston,	80	Thinning.
Murray Brown,	Acton,	10	Thinning and planting.
Mr. Brewer,	Harvard,	100	Chestnut blight.
A. C. Burrage,	Halifax,	20	Planting.
M. A. Chamberlain,	Ashland,	50	Planting.
D. F. Connolly,	Methuen,	4	Planting.
Howard Constable,	Kingston,	40	Planting and thinning.
H. M. Cutler,	Holliston,	100	Taxation.
Danvers State Hospital,	Danvers,	500	Thinning and planting.
E. I. Davis,	Holden,	86	Estimate.
D. A. Donahue,	Methuen,	5	Tree diseases.
C. G. Dyer,	Ipswich,	_1	Tree diseases.
G. H. Ellis,	Barre,	1,000	Chestnut blight and planting
F. C. Haskins,	Norwell,	77	Thinning and planting.
H. S. Hutchinson,	Middleton, .	13	Planting.
A. E. Hastings,	Orange, .	80	Planting.
Water Board,	Holyoke,	150	Planting.
J. F. Johnson,	Dana,	69	Planting.
E. D. Kendall,	Holden,	_	Estimate.
Grace Lawrence,	Westford,	10	Estimate.
Theo Manning,	Paxton,	60	Thinning.
Metropolitan Water Board,	Southborough, .	50	Thinning.
Mrs. Mund,	Millis,	25	Thinning and planting.
Harry Graves,	Palmer,	. 50	Chestnut blight.
W. V. Baldwin,	Wilbraham, .	60	Planting.
A. J. Peters,	Dover,	80	Moth thinning.
Pratt Brothers,	Belchertown, .	110	Taxation.
W. E. Putnam,	Danvers,	60	Moth thinning.
E. H. Sears,	Wayland,	_1	Chestnut blight.
Grazia Shaw,	Northbridge, .	15	Thinning.
J. S. Sills,	Shelburne, .	100	Thinning and planting.
	,		J

¹ Single ornamental trees.

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Ц	JIST	\mathbf{OF}	FOREST	EXAMINA	TIONS -	- Con.

Name.		Town.	Area (Acres).	Problem.	
W. D. Sohier,		Essex,	10	Moth thinning.	
Highway Commission,		Westford,	-1	Chestnut blight.	
H. P. Tobey,		Wareham,	300	Taxation.	
Water Board,		West Springfield,	300	Thinning and planting.	
E. W. White,		Savoy,	31	Planting.	
G. F. Whitney,		Natick,	4	Tree diseases.	
Town of Williamstown,			25	Thinning.	
C. G. Wood,		Concord,	35	Moth thinning.	

¹ Single ornamental trees.

REFORESTATION WORK.

Because of the creation of the State Forest Commission, with its power and appropriation to purchase waste land in large areas, it was thought best to discontinue temporarily the policy of purchasing lands under the terms of the reforestation law. We say temporarily because we believe that the 125 plantations set out under the terms of the reforestation law and scattered in dozens of towns over the Commonwealth have an educational value that a few State forests, no matter how extensive, can never have, and that it would be a mistake to permanently discontinue this policy. Our area of new plantations, therefore, is not as large as it would otherwise have been, and is confined to lands that were deeded to us free of cost, with the privilege of redemption on the part of the owner. We purchased one cut-over lot on Savoy Mountain, principally because one of our fire watch towers is located upon it, and its ownership by this department is desirable. The following table gives the details of the new lots planted, which total 540 acres. It is fair to state that parts of the Johnson and the Smith lots were set out in 1914, so that the area of new planting is actually around 400 acres, as compared with 500 last year.

New Work, 1915.

NAME.	Town.	Area (Acres).	Planting (Number of Trees).	Brush- ing (Acres).	Length of Fire Lines (Rods)	
Lessie Morgan, .		Hubbardston,	45	35,000	-	
Helena Johnson, .		North Adams,	100	25,000	-	-
Irving Smith, .		Ashburnham,	160	60,000	30	-
Irving Smith, .		Ashburnham,	40	33,000	-	-
Allen Hastings, .		Orange,	11	11,000	-	10
Philander Holmes,		West Brookfield,	46	45,000	-	-
Marcus Browne, .		Marlborough, .	33	30,000	33	-
Addie Browne, .		Marlborough, .	45	45,000	45	-
Chris Hansen, .		Marlborough, .	-	-	-	356
D. W. Gaskill, .		Upton,	60	35,000	-	-
Totals,			540	319,000	108	366

In addition to the new planting it is necessary each year to do what we call maintenance work. Brush must be cut where it is choking the growing pines; blanks in the stands caused by natural death must be filled up; and plantations burned by fire must be replaced. Last winter the Legislature appropriated \$100,000 for the relief of the unemployed, and \$6,000 was turned over to the forestry branch for use in our State plantations. This additional sum made it possible to do work which we otherwise could not have afforded to carry out. As the appropriation was used during the winter season the only work carried out was brushing, and that only on such lots as were near enough to town for the men to go back and forth to work. Lots in Gardner, Ashburnham, Marlborough, Lancaster, Kingston, Attleboro and Spencer were cleared by the use of money from this fund. The total area of the lots on which maintenance work was done amounted to 1,200 acres, 600 of which were brush-cleared. Lots in Yarmouth, Dennis, Attleboro and Oakham which had been burned over were replanted, and a total of 325,000 trees were used in replanting burned lots or filling in plantations. The following table gives the detail data of the maintenance work: -

Maintenance Work, 1915.

Lot No.		To	WN.			Area (Acres).	Filling in (Number of Trees).	Brushing (Acres).	Length of Fire Lines (Rods).
1	Westminster,			٠.		40	9,000	40	-
2	Westminster,					40	-	25	-
14	Westminster,					30	-	15	-
79	Gardner, .					79	60,000	-	-
104	Groton, .					13	1,500	-	-
105	Groton,					5	500	-	-
84	Nantucket,					83	30,000		-
70	Norwell, .					11	3,000	11	-
42	Hubbardston	, .				108	-	100	-
113	Medfield, .					28	6,500	8	-
55	Dennis, .					20	23,000	20	-
62	Yarmouth,					21	22,500	-	-
63	Lancaster,					74	5,000	74	-
66	Lancaster,					9	-	9	-
40	Ashburnham,					14	7,500	-	-
9	Ashburnham,					66	-	35	-
20	Paxton, .					55	4,000	50	-
44	Holden, .					50	-	40	_
12	Spencer, .					23	-	23	-
45	Brookfield,					37	10,000	37	_
48	Kingston,			1,0		14	3,000	10	-
16	Westminster,					25		-	105
11	Spencer, .					45	_	-	148
50	Oakham, .			٠.		55	20,000	-	-
02	Spencer, .					80	40,000	-	-
109	Spencer, .					40	18,000	10	-
69	Attleboro,					24	25,000	24	-
51	Hopkinton,					109	25,000	35	-
49	Carlisle, .					40	12,000	. 30	-
31	Sandwich,					20	10,000	-	-
	Totals,					1,247	325,500	606	253

	PURCHA	ASE .	AND]	PLAI	NTING	OF	For	EST LA	NDS.		
Appropriati	on for 19	15,			•	•				\$10,000	00
Expendit	ures: —										
Purchase of	land,							\$230	00		
Seedlings,								100	00		
Tools and e	quipment	,						276	10		
Labor, .								8,792	11		
Traveling e	xpenses,							219	09		
Teaming, ex	xpress, fre	eight	, etc.	,				382	20		
Stationery a	and posta	ge,							50		
										\$10,000	00

NURSERY WORK.

The close of the season finds us in an excellent position, with a larger amount of stock on hand than ever before. This is fortunate, because the demand promises to be greater next spring than in any previous year.

Our first nursery at Amherst was established in 1905 for the purpose of raising stock to be sold at cost to private landowners. As forest planting-stock must be two years old at least, to be salable, no stock was sold from this nursery until 1907, when a small amount was available. This policy was continued in 1908, but in the legislative session of that year the reforestation law, so called, which provided for the taking over and planting of large amounts of waste land, was enacted, so that our entire output was consumed in this work, and we discontinued the sale of stock. In 1912 the Legislature passed an act requiring the State Forester to supply the other State departments and institutions with forest planting-stock free of charge. The demand from this source was unexpectedly large, exceeding our own, and we have not yet been able to meet it fully. In 1914 the Legislature created a State Forest Commission, with power to purchase large tracts of waste lands. When this commission carries out the terms of this act it will have acquired, during the next four years, nearly 20,000 acres of waste land, most of which will need to be reforested. To plant this area will require not less than 15,000,000 transplants in addition to the 1,000,000 or more per year needed for the present work. As our present output is about 1,000,000 trans-

plants per year, the possibilities of increasing this output are giving us considerable concern. As the demands upon our nurseries have grown, and as they have been increased in size, we have naturally had to spend more money in their development and maintenance, so that while in 1912 our nursery account was about \$5,000, in the past year it was about \$10,000. This money comes from an appropriation of \$20,000 made for the general expenses of the forestry branch of the State Forester's office, covering salaries of assistants, clerk hire, traveling expenses, office expenses and printing, as well as nursery work. Where such a considerable proportion of this money is devoted to nursery work we are obliged to curtail on other lines, since the remaining half of the appropriation has to be devoted to purely administrative duties in overseeing reforestation work, nursery work, State forest reservations and the private cooperative work. Under the present circumstances it is not possible to make any scientific investigations of tree growth, surveys of forest conditions, or investigations of markets, matters which it is the province of a State forest department to seek information about and to publish for the benefit of the people. It is urged, therefore, that the appropriation for the nursery and general expenses of the forestry branch, which is now \$20,000, be substantially increased.

The Barnstable nursery has passed through the second year of its existence, and the entire 6 acres are under cultivation. Next spring it will yield results in the form of more than a million two-year seedlings ready to transplant, and half a million transplants which can be used in field planting if necessary. We took out of this nursery 75,000 transplants for planting during the spring.

The Amherst nursery has been our chief source of supply, as in the past. We have taken out 900,000 seedlings and transplants for field planting this year. The tables show in detail where this stock was used. Our inventory shows that we have on hand 360,000 four-year transplants, 290,000 three-year transplants, and upwards of 2,000,000 two-year seedlings. We do not attempt to count the one-year-olds.

During the winter we tore down three unsightly shanties which were used for living quarters for men and storehouses,

and replaced them by a small one and a half story cottage house. The lower floor contains a workshop, storeroom and superintendent's office, while the upper contains living quarters for the crew. Our own men did all the work of erecting the building.

The Amherst nursery serves as a general headquarters of our planting as well as nursery work, so that we were in need of an adequate building to serve as storehouse and workshop.

Owing to the fact that we were short of two-year seedling stock this last spring, no attempt was made to extend the nursery at the Bridgewater State Farm. The stock already there is doing finely, and with an abundance of seedling material next spring we plan to put in at least a million transplants. The great advantage of this nursery is the fact that the labor outside of the supervision costs us nothing.

STOCK SHIPPED OUTSIDE THE DEPARTMENT.

Consignee.	Species.	Class.	Num- ber.	Nursery.
Metropolitan Water Board,	White pine, .	4-year transplants,	45,000	Amherst.
Metropolitan Park Commission, .	White pine, .	2-year seedlings, .	100,000	Amherst.
Gardner Insane Colony,	White pine, .	4-year transplants,	15,000	Amherst.
Worcester Insane Colony,	White pine, .	4-year transplants,	5,000	Amherst.
Templeton Colony,	White pine, .	4-year transplants,	10,000	Amherst.
Fish and Game Commission, .	Red pine, .	3-year transplants,	7,000	Barnstable.
Harbor and Land Commission, .	Locust, .	5-year transplants,	12,500	Sandwich.
Wachusett Mountain Commission,	White pine, .	4-year transplants,	20,000	Amherst.
Rutland Prison Camp,	White pine, .	3-year transplants,	20,000	Amherst.
New Bedford Water Board, 1	White pine, .	4-year transplants,	10,000	Amherst.
New Bedford Water Board, 1	White pine, .	3-year transplants,	50,000	Amherst.
Uxbridge Water Board, 1	White pine, .	4-year transplants,	7,000	Amherst.
Lowell ParkDepartment, 1	White pine, .	4-year transplants,	500	Amherst.
Waltham Water Board, 1	White pine, .	4-year transplants,	1,500	Amherst.
Waltham Water Board, 1	Red pine, .	4-year transplants,	500	Amherst.
Waltham Water Board, 1	Spruce, .	4-year transplants,	500	Amherst.
Moth department, 1	White pine, .	4-year transplants,	30,000	Amherst.
Moth department, 1	White pine, .	3-year transplants,	5,000	Barnstable.
Moth department, 1	Red pine,	3-year transplants,	3,000	Barnstable.
Moth department, 1	Spruce, .	3-year transplants,	1,000	Barnstable.
			343,500	

¹ Trees purchased.

STOCK SHIPPED FOR PLANTING ON REFORESTATION LANDS AND STATE Forests.

No	RSER	Υ.		Species.		Class.	Number
Amherst, .				White pine,		4-year transplants, .	350,000
Amherst, .				White pine,		3-year transplants, .	174,000
Amherst, .				Red pine, .		4-year transplants, .	42,000
Amherst, .				Red pine,		3-year transplants, .	25,000
Bridgewater,				White pine,		4-year transplants, .	13,500
Barnstable, .				White pine,		3-year transplants, .	30,000
Barnstable, .				Red pine, .		3-year transplants, .	25,000
Barnstable, .				Spruce, .	:	3-year transplants, .	3,000
Barnstable, .				White ash,		3-year transplants, .	1,500
Hopkinton, .				White pine,		5-year transplants, .	25,000
Total, .							689,000
	_		-	rchased for field			30,000
				hased for nurser sed for nursery			. 200,000 50,000
Total numb							280,000

INVENTORY OF STOCK, STATE FOREST NURSERIES.

Barnstable.

S	PECI	ES.			4-Year Transplants.	3-Year Transplants.	2-Year Seedlings.	1-Year Seedlings (Beds).
White pine,					_	215,000	200,000	. 200
Scotch pine,					-	-	750,000	150
Red pine, .						100,000	50,000	25
Austrian pine,					-	35,000	50,000	45
Norway spruce,					50,000	30,000	50,000	-
European larch,			٠,		-	-	60,000	_
Balsam fir, .					-	-	44,000	-
White spruce,		٠			-	-	40,000	-
Arbor vitæ,					-	-	15,000	-
Red spruce,			**		-	-	15,000	-
Jack pine, .					-	-	30,000	-
Western yellow 1	oine,				- 1	-	4,000	-
White ash, .					-	-	50,000	_
Hemlock, .	٠.				-	-	-	5
Totals, .					50,000	380,000	1,358,000	425

INVENTORY OF STOCK, STATE FOREST NURSERIES — Con. Bridgewater State Farm.

Spec	TES.				4-Year Transplants.	3-Year Transplants.	2-Year Seedlings.	1-Year Seedling (Beds).
White pine, .	٠		٠		115,000	-	-	-
					Hopkinto	n.		
Norway spruce, .				4	25,000	-	-	-
White pine, .					25,000	-	-	-
Total,					50,000	-	-	-
Scotch pine, .			٠	•	-	-	104,000	
Scotch pine, .					-	-	104,000	-
Red pine,			٠	٠	120,000	19,000	90,000	41
Norway spruce, .			*	•	33,000	49,000	-	18
			٠	٠	-	9,000	-	35
European larch, .					-	-	-	3
	•							
Austrian pine, .		٠	٠	٠	-	3,500	· -	-
Austrian pine, . Hemlock,						3,500 5,750	-	
Austrian pine, . Hemlock, Arbor vitæ, .					· -		40,000	- - -
European larch, . Austrian pine, . Hemlock, Arbor vitæ, . White ash, Totals,					360,000	5,750	40,000	164

STATE FORESTER'S EXPENSES.

Appropriation for 1915,	•		٠		\$20,000 00
Expenditures: —					
Salaries of assistants,			\$4,722	90	
Traveling expenses,			3,181	11	
Stationery and postage,			612	06	
Printing,			565	77	
Maps, photographs, books, etc.,			312	21	
Equipment, tools, etc.,			506	77	•
Sundries, including teaming, .			93	24	
Amounts carried forward, .			\$9,994	06	\$20,000 00

Amounts brought for	ward,			\$9,994	06	\$20,000	00
Nursery account: —							
Pay roll,				6,798	81		
Travel,				24	28		
Equipment,				 1,217	50		
Seeds and seedlings, .				1,298	81		
Express, freight and tear	ning,			583	14		
Sundries,				83	31		
				 	-	19,999	91
Balance returned to	treasu	rv.				\$0	09

STATE FORESTS.

Acts of 1914, chapter 720, provided for the creation of a State Forest Commission of three men, of whom the State Forester is one, to acquire, as the act states, "by purchase or otherwise woodland or land suitable for timber cultivation within the commonwealth at a price not to average more than five dollars per acre." Section 3 of this act goes on to say that State forests acquired under this act shall be under the control and management of the State Forester, and that he shall publish in his annual report an account of all money invested in each forest and the income and expense thereof. For this reason we include in this report an account of the management of the Otter River State forest in Winchendon, Royalston and Templeton. This forest is the only one which to date has been purchased and title passed by the State Forest Commission, so that it is the only one as yet under the management of the State Forester's department. For the activities of the Forest Commission in the investigation, survey and purchase of this and other proposed State forests you are referred to their annual report which is published as a separate public document.

The Otter River State forest, containing 1,700 acres, is located in the southwest corner of Winchendon, and runs over into adjoining portions of Royalston and Templeton. It lies on both sides of the Fitchburg railroad, commencing at a point about 1 mile west of Baldwinville and continuing for about 2 miles. The Otter River flowing northwesterly, and the Miller River flowing southerly, join in the center of the forest, and the united streams continue westerly as the Miller River.

The electric-car line between Winchendon and Baldwinville passes through the eastern section of the forest, and fair country roads make all sections accessible. This forest could not be situated in a more favorable position as regards markets for lumber. Winchendon village is one of the leading wood-using centers of the State, and lies 4 miles away, while Baldwinville, also an important wood-using center, is only 2 miles away.

The land is for the most part flat and the soil light, but not sandy. The areas purchased were largely cut-over lands or abandoned pastures. Except in portions near the railroad which have been burned, there is an immense amount of volunteer pine reproduction on this forest. Conditions for artificial planting are excellent.

One of the problems in the management of this tract is that of fire protection, owing to the fact that the railroad passes through it. Natural conditions help in this protection, because Miller River parallels the track for part of the distance and makes an efficient fire stop on one side. During the summer we constructed fire lines on both sides of the railroad and for some distance along the electric road.

At the time of the spring planting season the process of purchasing the land was going on so that it was not possible to do very much in the reforestation line, but about 70 acres were set to small pines. During the winter we will clear the brush and will be prepared to reforest 200 to 300 acres in the spring.

When one of the properties, called the Goodnow Farm, was acquired there was taken with it the farmhouse and barn. Our men have painted and made minor repairs on the house, so that it now makes an excellent headquarters camp for the men. An acre of land has been plowed up and will be used as a transplant nursery from which stock can be taken for future planting on State forest land. Seedlings for transplanting will be provided from our Amherst or Barnstable nurseries.

The following table is a financial summary of the money expended in the purchase and the development of the Otter River State forest during the past year. The first four accounts are incident to the acquiring of the land, and the money expended in this work was spent under the jurisdiction of the Forest Commission; the remaining five items are incident to the management of the property, and the money was spent

under the jurisdiction of the State Forester. Practically all the funds came from the appropriation of the Forest Commission except in the items entitled brush cutting and planting, which were taken from the unemployed fund.

Account.	Land.	Labor.	Teaming and Express.	Supplies.	Travel and Board.	Total.
Cost of land,	. \$7,871 34	_	-	_	_	\$7,871 3
Purchase expense,		-	-	-	\$412 35	412 3
Title examination,		\$160 201	-	-	-	160 2
Survey and setting bounds,	-	676 12	\$88 59	\$172 09	184 54	1,121 3
Fire lines,	. -	1,023 05	12 78	9 00	19 50	1,064 2
Planting,		235 10	23 00	-2	-	258 1
Brush cutting,		278 20	-	8 31	-	286 5
Headquarters,		441 22	4 00	248 00	-	693 2
Nursery,		8 25		1 35	-	9 6
						\$11,876

¹ This amount is incomplete, as all the bills have not been paid.

FOREST TAXATION.

The forest taxation law, passed in 1914, has not had the wide use which we believe it should have. To date not more than a dozen woodland owners are known to have registered their land.

We believe that there are three reasons why this law is not made use of more fully.

The first is that, on account of the length of the law and the difficulty of understanding its provisions, owners hesitate to take advantage of it. The law, however, is more simple than it appears, and this is especially true of the sections dealing with young woodland, erroneously called "plantation" in the law. In the long run it is "plantation" which should be registered and which will benefit most materially under the terms of the law. Owners wishing to register such land will leave out of consideration section 7 on the commutation tax, and they will find the taxation law easy to understand.

The second hindrance to a fuller use of the forest taxation law lies in many cases in the opposition of local assessors who,

³ Trees; 65,000 supplied from the State forest nursery without cost.

not comprehending it, see in it only a scheme for evading taxes. They place obstacles in the path of the would-be register of land by forcing appeals to the State Forester or Tax Commissioner, by not making the necessary valuations, and in other ways delaying the game, so that the owner who might have his land classified becomes discouraged and gives up the attempt.

The third and most general reason why landowners do not seek to register their land is because under the present system woodland is habitually undervalued, and the owners are not forced by economic necessity to seek relief. This condition, however, is bound to change as years go on, for the percentage of valuation of woodlots is constantly rising, and when it approaches somewhere near full value the owner will be obliged, as a financial necessity, to cut his timber or to seek relief in registering his land under the law. We would give the owners of young timber, sprout land or plantation a hint that it will be greatly to their advantage to register their land now when it can be classified as plantation, and not to wait ten years or more when the land must be classified as woodlot.

WHITE PINE BLISTER RUST.

This is a fungous disease which attacks the trunks of small pines and the smooth bark branches of larger trees, gradually girdling them and causing the death of small trees and the severe injury of the larger ones. The disease, like other rust fungi, has two hosts, — the five-needled pines and the currant and gooseberry family (Ribes). The spores of the plant which are produced on the pines cannot infect other pines, but must first find lodgment on the leaf of a currant, where a different form of spore results which in turn can infect the pines. The damage to currant bushes caused by this disease is very small.

This disease is a native of Europe, and has been brought into this country in importations of foreign nursery stock made prior to 1912, when a complete embargo on the importation of white pine from Europe was put into effect.

The attention of plant pathologists was first directed to the disease in 1910, and this department immediately became in-

terested, because during the previous year we had imported about half a million white pine transplants from Germany which we had set out in State plantations. Dr. Perley Spaulding, of the Federal Bureau of Plant Industry, came on and looked over some of the plantations. No signs of the blister rust were seen, but this fact was not necessarily reassuring, because a pine may have the disease several years before showing signs of it. As a matter of precaution, he advised that we look our plantations over for wild currant, and pull up all that we found. Consequently, a couple of our most intelligent laborers were instructed in this work, and during the summer went over all our plantations where the German-grown white pines had been set, and searched for wild currants.

In 1912 the State Nursery Inspector, Dr. Fernald, took up the work of investigating the status of the disease, which by that time had been found fully developed on several imported pines in Hamilton and Ipswich. We gave to his department a list of all our plantations containing imported nursery stock, and maps to show their location. As a result of his investigation infected trees were found and tagged on a plantation in Westminster. We also found a few trees on a plantation in Spencer. These trees were afterwards pulled up and burned. On these two lots in every case the infected trees were imported stock, which had the disease when they were planted. There is no evidence as yet to show that the disease has spread from these pines to currants and hence back to native pines. The State Nursery Inspector has during the past fall found the disease on currant bushes in the Housatonic valley region, and this is a more serious phase, for it indicates that the blister rust has spread from the original infected pines to the currant, and teleutospores produced on this plant are ready to spread to native pines, if they have not already done so.

Every effort should be made to keep watch on those areas known to have the disease present, both to watch its effect and to prevent the spread. Further light is needed on the status of the blister rust in Europe, for while some published authorities call it a dangerous enemy to the white pine, others pass over it in an indifferent manner. It is well to recall that the white pine is not peculiar in being subject to this disease, for

there are other forms of blister rust, and practically every species of pine that grows is subject to some one of them.

We are often asked if this disease may not prove as disastrous as the chestnut blight, and we feel safe in saying no. There is this important difference; while the chestnut disease spreads from tree to tree the blister rust must go from pine to currant and currant to pine, and this fact limits its spread. It is a disease primarily of the nursery and young plantation, and not of the wild woodland.

CHESTNUT BARK DISEASE.

No especial investigation of the spread or present status of the chestnut blight has been made during the past year. Owners of chestnut woodland have appealed to our department for advice as to treatment, and we have made many examinations of infested woodlands. These are listed under woodlot examinations in another section of this report.

The bark disease is now to be found in every section where chestnut grows. The past summer, with its abundant rainfall, was extremely favorable to the development and spread of a fungous disease similar to the chestnut blight. The extent of it will be apparent next summer.

As a sidelight upon the spread of this disease, the following, upon conditions at Mount Holyoke, is interesting:—

In September, 1912, Mr. Cook of this department made an examination of the property of the Mount Holyoke Company, and in his report made the following statement:—

I estimate that about 5 per cent. of the chestnuts are at this time dead or dying from this disease, and if it continues to increase at the same rate in the next two or three years as it has in the past year few trees will remain uninfected at the end of that time.

Three years afterward (November, 1915) Mr. Haynes of this department examined the same property, and reported that more than 90 per cent. of the trees are infected with the blight and 75 per cent. are dead or nearly so, —5 to 90 per cent. in three years, or an increase of 1,800 per cent.





A four-year-old white pine transplant covered with the characteristic white downy matter which conceals the pine aphid.

A young white pine recovering after weevil attack. A lateral branch has twice assumed an upright position after the death of the main shoot, and the mature tree will be comparatively straight.

WHITE PINE WEEVIL (Pissodes strobi, Peck).

The white pine weevil is doubtless the worst enemy of young white pine in this State. It is a somewhat elongate, brownish snout beetle, 4 to 5 millimeters in length. The winter is passed in the adult stage. The beetles come out of their winter quarters and fly early in May, and, after feeding for a few days on the bark of the living white pine terminal shoots, deposit their eggs in punctures in the bark of the shoot of the previous year's growth, placing one or two eggs in a pit or cavity in the inner bark made by the beak of the mother beetle. The small white grubs (larvæ) which hatch out are responsible for the damage which then occurs. They eat their way downward, killing the leader or main shoot of the tree. The white pine shows remarkable recuperative ability against weevil attack. When the main leader of a young tree has been killed one of the lateral branches gradually assumes an upright position and takes its place. Sometimes this branch is in turn killed, and many cases are known where for the second time a lateral shoot has become the leader and developed into a comparatively straight bole.

The best remedy against this pest is to cut and burn the affected shoots before the grubs have developed into adults, bored their way out and departed. Some experiments in spraying have been conducted by the Connecticut Agricultural Experiment Station, and their opinion is that, if the trees are sprayed during the few days devoted by the mother beetle to feeding, and previous to depositing the eggs, some damage may be avoided. The combination recommended is commercial lime and sulphur, 1 to 8.

An excellent treatise on this pest is by Dr. A. D. Hopkins, United States Department of Agriculture, Circular No. 90.

WHITE PINE APHID OR MEALEY-BUG (Chermes pinicorticis, Fitch).

The pine aphid is one of the many species of plant lice, and appears on the smooth bark of young trees where it sucks the sap. The aphid is easily recognized in the form of patches of flocculent downy matter, concealing minute insects which

emerge in large numbers and travel actively over the bark for a time. When newly hatched the insect itself is so small as to be nearly invisible to the naked eye, and in the early part of May they are more abundant than at any other time. Traveling soon ceases, and they attach themselves to the tender bark of young twigs. They increase rapidly in size, assume a dark reddish brown color, and the secretion from the body commences and soon hides them from view. Maturity is reached about the last of May, and the wingless females deposit eggs for another brood. There are several broods during the summer, and the winter appears to be passed, at least in some years, by the females as adults, which emerge during the latter part of March and begin to feed. They deposit eggs early in April.

The presence of large numbers reduces the vitality of a tree and apparently leads to a sickly condition, but no great permanent damage as a rule results. The insect was first noticed by Dr. Fitch as early as 1856.

The best measure to be taken against its damage in the event that it becomes very abundant on valuable trees is to spray with kerosene emulsion. The formula is as follows: $\frac{1}{2}$ pound of laundry soap, 1 gallon of water. Boil, and then add 2 gallons of kerosene. In spraying dilute with 15 parts of water.

EXHIBITIONS.

When the citizens in any section of the Commonwealth meet together for the purpose of considering ways and means of progress and the promotion of efficiency they usually install exhibits showing the results achieved under the best methods of the present time. These exhibits cover a wide range of subjects, including all forms of agriculture and the processes of good local government. The State Forester is often requested to exhibit at these gatherings. There is a large amount of educational work to be done from year to year by means of lectures, supplemented by the use of lantern slides and moving pictures. In some cases the State Forester has caused to be installed exhibits in picture form showing the practices of forestry, and actual specimens of seedlings and transplants from the State's nurseries. Several granges throughout the

State have during the past year requested and received specimens of forest trees to exhibit to their members, and a large number of inquiries by mail has followed in the wake of these gatherings.

Two exhibitions where the State Forester has placed assistants in charge for several days are worthy of especial note. At Barnstable, where one of our nurseries is located, an exhibit was installed during the week of the Barnstable County Fair in September. Transplant beds were made on the grounds, and in a tent close by pictures showing the different lines of forest work were arranged in their respective groups. A large number of people visited the Barnstable State nursery during the week of the fair.

During the week of the Exhibition on City Planning, held at the State House November 12 to 20, the State Forester was requested to co-operate. A report of the exhibit was later requested by the committee, and a copy is herewith given:—

The State department of forestry, while not directly connected with the development of Boston, was requested to install an exhibit for the purpose of encouraging the planting of shade trees and the reclamation of waste areas of land. As the State Forester, F. W. Rane, pointed out in his address at the 3 o'clock afternoon gathering on November 18, any city might well own and control its own city forest, derive an income from it and contribute greatly to the health and pleasure of its citizens. Such a system has long been in force abroad, and has met with universal success. To this extent forestry is in harmony with all forms of city welfare. This address was illustrated with moving pictures and lantern slides.

The State Forester's exhibit, in charge of J. R. Simmons, assistant forester, consisted of three groups. The whole life history of gypsy and brown-tail moths was shown by the use of mounted specimens, supplemented by pictures showing the past and present conditions and the radical treatment of these pests as promoted by this department.

A table was devoted to showing the leading species of forest trees, from seedlings to four-year transplants. All of these were actual specimens taken from the State nurseries.

The relation of forests to rainfall was demonstrated by the use of two mountains in miniature made from sand, one barren and the other forested. Water poured upon these mounds through a large sprinkler demonstrated in a vivid way the effect of erosion.

As a background to these exhibits, a large number of pictures representing the different phases of the department's work was shown. Five large frames of photographs were arranged to show the construction and use of a model forest fire tower. Other pictures demonstrated the reforestation of waste land and the results of reforestation at the end of from forty to fifty years. Posters urging the co-operation of all citizens, bulletins and printed matter from the State Forester's office were placed in conspicuous places to catch the eye and arouse a train of thought in the mind of the observer.

The objects of forestry are many, and the plans for the future of every great city should include not only systematic planting and care of its street trees, but a municipal forest as well.

Forestry. -- Moth Work.

This past year forestry practice as applied to the moth work has become firmly established, and has been worked out with enthusiasm and success by all branches of the department, and over all the infested area. Most of the district and local moth superintendents have advocated and carried on moth thinnings with success and satisfaction. The work of the foresters in the moth department, instead of being mainly that of organizing and experimenting, as it was at the start, has become largely concerned in the management of thinning operations and the utilization of their product.

Examinations. — During the past year 43 formal examinations of woodland were made for owners who desired advice as to the handling of the moths in their tracts. Most of these examinations were followed by written reports. They covered a total of 3,706 acres, and the lands examined were situated in 35 different towns or cities. Besides these, a large number of informal examinations were made where merely advice was given and no records kept. This year a list of infested woodland throughout the State was made up as previously, but no letters or circulars were sent to the owners, as it was thought that by this time most of them were sufficiently informed about moth thinnings.

Co-operative Moth-thinning Operations.

During the year 22 moth-thinning operations were carried on in co-operation with owners of woodland. In these operations the owners paid all of the actual expenses of doing the work, and received all the returns from the products cut and



A moth thinning at Haverhill.



Chestnut poles and moth thinning in Dover.



sold. This department, however, had complete management and supervision of the work. These operations have been carried on under the best forestry practices, and have not only aided in the solution of individual moth problems, but have served as an example to be followed by other owners on their own initiative. Much of the wood and lumber cut would have gone to waste, and worse than that, the land on which it stood would have gone unused, if this department had not aided. Wherever cuttings were made, proper measures for the regeneration of the woodland were taken. These operations have shown that the moths in the woodland do not present a hopeless problem, but may result in better forests in this State in the future than would have come had not these pests come upon us. Most of these operations will yield a financial profit to the owners as well as an improved woodland.

Co-operative Moth-thinning Operations, 1915.

Name of Owner.	Location.	Area (Acres).	Character of Operation.
Constance L. Abbott,	Haverhill	40	Portable mill.
G. M. Angier			Cordwood.
	Stow,		Cordwood, ties and logs and spraying.
Florence Cushman,	Harvard,	30	Cordwood, mostly birch.
Abbie G. Davis,		25	Cordwood and logs.
	Rochester	40	Cordwood and logs.
Levi H. Greenwood,	TO1 .3	20	Cordwood and spraying.
Haverhill Water Works	WY 2 133	50	Portable mill and planting.
Chas. W. Hubbard	Auburndale,	150	Portable mill, spraying and
			planting,
Ellerton James,	Randolph,	50	Cordwood and chestnut
C. H. Jones,	Weston,	60	Cordwood and logs.
H. A. Lamb,	Milton,	15	Cordwood and logs.
W. S. Leland.	Middleborough	11	Cordwood and spraying.
W. S. Leland,	Middleborough	30 {	Planting.
	Rochester,	400	Portable mill and spraying.
Nichols Heirs,		80	Portable mill and planting.
Sarah E. Pratt,		35	Portable mill.
Wm. E. Putnam,		60	Cordwood and logs to sta-
Quittacus Syndicate	Rochester,	15	Cordwood and spraying.
Sagamore Beach,		50	Cordwood, spraying and
			planting.
Dr. H. O. Spaulding,	Hingham,	35	Cordwood, logs and piling.
Nathaniel Stevens,		200	Portable mill, spraying and
•			planting.
Arthur Winslow,	Middleborough, .	50	Cordwood, logs and spraying.
Total,		1,485	

On these co-operative operations \$70,438.33 was spent during the past year. All of this sum was advanced by the various owners, and spent under our direction and supervision. Over 90 per cent. of this amount is for labor, and does not include certain compensating costs, as shipping, freight, etc., which are deducted from the receipts when the material is sold. The chief advantage of this expense is that although it was used in combating the moth pests, it will all come back in the sale of the 2,796,438 feet of lumber and 12,295 cords of wood that were cut. Probably the average value of the lumber would be about \$18 a thousand feet, making its value a little over \$50,000. At only \$2 a cord the total receipts will exceed the expenditures by \$5,000, and \$3 would be nearer the average price obtained for the cordwood. The expense of the operations includes not only the cost of cutting the wood and lumber, but also the cost of burning the brush and of considerable spraying and planting. Thus it can be seen that this moth-thinning work pays for itself.

In an annual report there is not space enough to go into details about individual operations, but much of interest might be written. Accurate cost data of most of the operations have been kept, and it is hoped that some time a bulletin may be published which will particularize much of the practical and scientific information which has been gathered.

Utilization.

The most important developments in the moth-thinning work during the past year have been along the lines of the utilization and sale of the forest products cut. A large amount of data as well as of practical experience along these lines has been obtained. It was early seen that it would be fruitless to cut infested and dying oak trees unless the product could be sold for at least what it cost to cut it. The wood might better rot on the stump than have it rot on the ground after money has been spent to cut it. At first, when only small amounts were cut, a ready market was found, but as the volume of the work has increased, it has become increasingly difficult to dispose of the product. Almost anybody will consent to carry on a resistant thinning now if he can be assured that he can sell the product at a fair price. Thus it has developed that the scope and usefulness of the thinning work are limited only by the utilization of the products.

Cordwood, lumber, piling and logs for special uses are the main products of the moth thinnings. Oak is the chief species cut, so oak utilization is the main problem. The best and finest of all these materials find a ready market at good prices. However, most of the product of the thinnings is not the best. Most of our infested woodland is of smaller sprout growth, and much of it is already dead or badly injured by the moths. The difficulty of the situation has been further increased by the poor business conditions of the past year. The efforts at utilization have, however, been very successful, although only a start has been made. The four main lines of endeavor have been (1) investigation, (2) education, (3) substitution and (4) new markets.

An attempt has been made to find out all the principal oak users of this section of the country, to study their needs, to find out what and how much they use, and to get their individual ideas. This has resulted in some very useful data, and given us a thorough understanding of the situation from the consumer's point of view.

Education has been necessary both for the consumer and the producer. The consumer has often not known just what our native wood lumber is, and how adaptable it is to his uses. Many of the producers have been woefully ignorant as to the needs of the consumer, and have lost much thereby. In fact, the situation has come to such a pass that in many sections of the eastern part of the State the ordinary lumbermen will not handle oak at all. They buy a woodlot, cut off the pine, but leave the oak to rot or for cordwood, because they say that they cannot dispose of it as lumber. If these men were only better informed about the oak market and uses they could easily dispose of much of their oak at a greater profit than the pine.

There is a great need of education along these lines for the dealers in and consumers of cordwood. In certain sections, notably the metropolitan district, it is impossible to sell cordwood unless the wood is practically all cleft, and also it is becoming very hard to sell oak wood of any kind. This is because of a prejudice of the dealers partly inspired in them by a like prejudice in the consuming public, which wrongly requires large maple wood. Those who know, as the farmer who

has burned wood all his life, will tell you that small wood mixed with the large cleft wood makes a better fire and is more economical to burn than big wood alone. Any one can easily demonstrate this to his own satisfaction if he will try the experiment. This prejudice makes the price of wood higher and the demand smaller; also it causes a large waste of the smaller, poorer wood. The reason why it is hard to sell oak wood now is because the dealer will tell you that his customer would rather have the fast-burning maple and birch, or even pine. The consumer should know that the real hardwoods, as oak and hickory, have more fuel value, burn much longer with less sparks, and are really much more economical than the maple or birch. In localities where the inhabitants know the real value of wood as a fuel the oak commands a higher price than the maple. We believe that there is a great chance to educate the public and the dealers along these lines, and thus market much wood which is now going to waste.

Much valuable work has been done along the line of substituting our native oak for oak or other woods which were obtained from outside the State. One large railroad which formerly bought al of its car stock in the central and southern States is now buying it right here in Massachusetts. Several others—large consumers—have been shown the adaptability of our native lumber to their purposes, and are buying it here when they can get it. This substitution of native products for those grown outside the State can be carried on to a much larger extent if the producer will only take the trouble to study his markets.

Several new markets have been developed for oak products and old ones extended. No car stock had been produced in recent years in certain sections of the State until this department started sawing it out on its co-operative operations. That is just one example out of many. There is a necessity for further investigation and experiment along this line, which may yield good results.

A bulletin on oak utilization in Massachusetts is now in preparation, and when published it is hoped that it will result in the bringing of the producer and consumer together, and the profitable utilization of much that is now practically going to waste.

Co-operative Utilization.

In all the moth-thinning operations undertaken in co-operation with the owners, this department, as well as managing the operation itself, has taken charge of the utilization and sale of the products cut. It has been mainly because of this that we have been able to get a true insight into the problems of utilization as a whole. The chief trouble with the mass of publications which have been issued concerning utilization is that they are impractical, because the writer has merely investigated and tabulated figures and data, instead of trying to sell the goods he writes about so glibly. It is one thing to write the fact that the chair manufacturers are the largest single users of oak in the State, and yet an entirely different thing to cut some oak and sell it to these chair manufacturers at a good price, or to determine whether this certain lot contains material suitable to be disposed of as chair stock to the best advantage.

It is by giving practical aid and advice to the owners of woodland that this department is co-operating along utilization lines. We are actually selling the products for the owners, or, after examination of the growing stand and thorough investigation of local conditions of labor transportation and market, giving them really expert advice.

Some very effective work has been accomplished in disposing of small lots of material. For instance, a certain owner has a few large oak trees which need to be cut. There is not enough lumber in them to pay anybody to bother with it, and all that can be done, under ordinary methods, with these large oaks is to laboriously split them up into cordwood, which will not be worth the cost of chopping it. In a number of such cases this department has been able to arrange to get these oaks sawed up into lumber and sell it along with other lumber from other lots, making a total large enough for some one to bother with. The lumber has given the owner a profit for his trees instead of a loss, as would have resulted if cordwood had been the product. Wherever a portable mill has been at work on one of the cooperative operations we have been able to have small owners near by haul in their few oak logs and dispose of the product along with the rest, thus effecting a saving to them. a large opportunity for further efforts along this line.

On the co-operative operations which this department has managed, over \$100,000 worth of products has been cut. Most of these products have been sold or are under contract of sale, the sale being due to the efforts of this department. Some have been sold directly to the consumer, and some through the regular dealer or middleman. It has been the policy to sell through usual channels where possible, so as not to compete or cut prices. Eight or 10 cars of lumber and cordwood are now being shipped each week from these various operations, and the various matters of shipment, billing and collection are handled through this office.

Finally it should be said that the co-operative utilization and marketing of forest products comprise a field which is opening up new possibilities of usefulness for this department, and if followed out will bring good results to the forest owners of the State.

The Lumber Market.

The market for native lumber is beginning to pick up. During the past year the business depression and the large stock of cut lumber unsold resulted in low prices. In certain kinds the prices dropped almost 25 per cent., while even the staples, as box boards, suffered a dollar or two reduction per thousand. However, the prosperity now coming has quickened the demand, and many kinds have nearly reached their previous prices. The amount of material actually being shipped to the war zone from this State is probably small, although a certain amount for cases, wheels, trucks, boxes, boats and perhaps a little dimension lumber is finding its way into export. In general it can be said that except for temporary depressions there will always be a good market for local lumber products, even of the poorer quality. This is the reason why forestry in the Commonwealth will prove a good investment.

Cordwood Situation.

Enough has been said in other portions of this report to show that the cordwood situation is serious. Due to cuttings on account of the gypsy moths, largely advocated by this department, there is now an overproduction. The wholesale price has dropped from \$0.50 to \$1.50 on a cord in many places,



Taking out the hardwoods that are the natural food of the moths. The remaining pines will aid in reseeding the ground.



All moth food trees have been taken out, leaving largely a white pine stand which will need no further expense from moth suppression. The possibilities of future values are greatly enhanced also. New Bedford waterworks property at Middleborough.



although as usual the retail price has not taken a corresponding reduction, and the dealers are reaping the benefits. It is necessary that the large production keep up, else the trees will be killed and the wood go to waste. We believe that a considerable portion of this increased production could be taken care of if the retail price could be reduced. If the dealers are unwilling to do this it may be necessary to devise some method of selling direct to the consumer at a lower price. If something is not done the farmers and forest owners will lose thousands of dollars that they can ill afford.

This department is now experimenting on new methods of cordwood utilization which may enable us to use up large amounts at a profit. Before long we hope to be able to announce success along these lines.

THE STATE FIRE WARDEN'S REPORT.

Mr. F. W. RANE, State Forester.

Sm: — In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year: —

With the exception of the severe drought that occurred during the months of March and April the season has been a very favorable one. During the month of March the reports from the Weather Bureau show .06 of an inch of rainfall, establishing a record for dryness in the history of the Weather Bureau back to 1885. During this period our records show 2,393 fires with a loss of \$107,995. It is very unfortunate that a drought should have occurred at this season of the year, as vegetation not having started, it made ideal conditions for forest fires. This drought lasted forty-six days, and reports from our observation stations show from 300 to 600 fires per week, a large percentage being confined to the eastern part of the State.

During the months of June and July we were able to discontinue the use of eleven of our stations, thereby allowing us to apply more of our appropriation in construction work, also to use many of our observers in this line of work.

The same arrangement of districts has been maintained as during the past two years, district No. 1 including Essex, Norfolk and Middlesex counties, No. 2, Barnstable, Bristol and Plymouth counties, No. 3, Worcester County and west to the Connecticut River, and No. 4, Berkshire County and east to the Connecticut River.

Two changes have been made in the personnel of this branch of the department. Mr. Miner E. Fenn, formerly assistant in this office, was

made locomotive inspector, and was succeeded in the office by Miss Josepha L. Gallagher, who was transferred from the moth department.

We have erected six steel towers as follows: through the courtesy of Mr. S. B. Pearmain, owner of Nobscot Hill in Sudbury, we were allowed to lease the top of this hill for a term of years, and have erected a 40-foot steel tower with a 10-foot room. This is an important station, as it covers a large amount of forest area that has been more or less subject to forest fires. The towns of Sudbury, Weston, Wayland and Framingham each contr buted \$100 towards this tower.

The 30-foot tower in Westborough has been replaced by a 60-foot tower, thus allowing a better outlook and covering this territory much better than with the former tower. The town of Westborough contributed \$100, and Upton and Grafton \$75 each, towards this tower.

A new 40-foot tower was erected on Barden's Hill in Middleborough, the town of Middleborough contributing \$150 and Carver \$100 towards this tower.

As the 60-foot tower erected last year on Copecut Hill in Fall River covers territory formerly partially protected by Richmond Hill tower in Dighton, I found it advisable to move the 30-foot Richmond Hill tower to Great Meadow Hill in Rehoboth, adding 16 feet to the height of it, thereby better protecting the forest area in Taunton, Attleboro and Norton. Taunton, Attleboro and Rehoboth each contributed \$100 towards this tower, and Norton \$50.

Through the courtesy of Mr. Charles Robinson of Providence, R. I., we were allowed to lease the top of Wigwam Hill in Mendon, and have erected a tower there similar to the others. Aside from the area covered in Massachusetts from this tower, we also cover some of the most valuable woodland in the State of Rhode Island. This tower also covers a portion of the so-called "Douglas Woods."

A new 30-foot tower with stairs was erected on Berlin Mountain in Williamstown. This is a co-operative tower, being maintained jointly by New York, Vermont and Massachusetts. This covers the west side of the Greylock Range and valuable timber land in the adjoining towns, as well as a large amount of forested area in Vermont and New York. The residents of Williamstown have subscribed \$150 for the stairs of this tower.

A 40-foot tower was erected on Lenox Mountain in the town of Lenox. This covers a large portion of the so-called Whitney Reserve, as well as valuable holdings in the adjoining towns. The residents of the towns of Richmond, Lenox and Pittsfield have subscribed \$200 in payment of the stairs of this tower.

A co-operative 30-foot steel tower with stairs was erected on Mount Everett. This tower is maintained jointly by Connecticut, New York and Massachusetts, and covers a large amount of forest area in the three States. The town of Great Barrington contributed \$150 in payment of the stairs of this tower.

These new towers all have a 10-foot square room at the top, equipped with our sliding map-table and long-distance telephone connection.

This construction work has been done entirely by our district forest wardens and observers. We maintained our own camping outfit, thereby lessening the expense of construction very materially.

Since our fire season closed our men have been constructing telephone lines. A new line is being constructed from Seaside to Monk's Hill in the town of Kingston, a distance of about 2 miles, where we shall locate a 30-foot tower this coming year, probably doing away with the Plymouth tower as a permanent station. We are also constructing 3 miles of telephone line to Lair's Hill in the town of Tolland, where we shall put the 30-foot tower now in use on Becket Mountain, adding 20 feet to its height, thus making a 50-foot tower. I also desire to locate a 40-foot tower on Holcomb's Hill in Chester, which will complete our observation tower system in the Berkshire district. A new tower should also be established on Watatic Mountain in the town of Ashby, which will cover the recently purchased State reservation in the town of Winchendon, a large portion of forest lands in Ashburnham, Ashby, Townsend and Fitchburg, as well as valuable woodlands in New Hampshire. A portion of the maintenance of this tower would be paid by New Hampshire.

Owing to our discontinuing the use of the Blue Hill observation station it is necessary that a station be located on Prospect Hill in Hingham, which will protect the east side of the Blue Hills Reservation. The tower on Moose Hill in Sharon protects the west side.

The new slash law which became effective January 1 is giving general satisfaction. Owing to the many stationary sawmills, wood-using industries and 221 portable sawmills in operation during the year it is necessary that the law be strictly enforced. As the operation of it is entirely in the hands of the forest wardens it has been a difficult problem to have it enforced in every instance, as I would desire. In many cases I find that, owing to local conditions and possibly some personal reasons, some wardens have desired to place the responsibility of carrying out this law upon this department, and while we would be glad to assume it, our authority is simply in an advisory capacity. Our district wardens have, however, visited many towns and seen that the law was properly adhered to. I feel confident that in the coming year we shall experience very little trouble in enforcing this law throughout the State.

The permit law, which has been in operation for the past few years, has also given general satisfaction, 24,507 permits being issued. We have had some trouble in prosecuting violators of this law, owing to the law being amended two years ago, and many judges holding that while the towns accepted the act in the first instance, they never have accepted it as amended, and for this reason many cases have been thrown out of court.

Reports received from forest wardens show that 65 parties were prosecuted for violating this law, 18 of whom were convicted, 30 were allowed to settle by paying the expense of extinguishing, and 17 were discharged.

As there are less than 20 towns that have never accepted this act, it seems that it would be advisable to recommend to the General Court that the law be further amended, making it apply to every town in the Commonwealth. This would not only do away with any question that might arise in enforcing it, but would make the law general throughout the State.

FIRES REPORTED FROM OBSERVATION STATIONS.

	_	 				
					1914.	1915.
Baldpate Hill, Georgetown,					-	213
Barden's Hill, Middleborough,					133	128
Becket Mountain, Becket,				٠.	63	46
Berlin Mountain, Williamstown,					-	56
Blue Hill, Milton,					236	-
Bluff Head, Sharon,					203	280
Bonney Hill, Hanson,					68	167
Bournedale, Bourne,					54	114
Copecut Hill, Fall River,					33	453
Cran Pond Hill, Ashfield,					2	24
Everett Mountain, Mount Washingto	n,				-	3
Fay Mountain, Westborough,					386	530
Grace Mountain, Warwick,			,		94	36
Great Meadow Hill, Rehoboth,					105	101
Hart Hill, Wakefield,					174	263
Harwich, Harwich,			÷		 35	31
Howland's Hill, Falmouth,				١.	1	13
Lincoln Mountain, Pelham,					47	59
Massaemet Mountain, Shelburne Fal	ls,	•			130	104
forse Hill, Essex,					96	272
Mount Tom, Easthampton,					135	72
Nobscot Hill, Framingham,					-	98
Reservoir Hill, Plymouth,					116	102
Robbins Hill, Chelmsford,					302	276
Shoot Flying Hill, Barnstable, .					14	42
Steerage Rock, Brimfield,					90	86
Tower Mountain, Savoy,					11	13
Vachusett Mountain, Princeton,					485	598
Totals,		2			3,013	4,180

Forest Fires of 1915.

	Mon	res.			Number.	Acres.	Cost to extinguish.	Damage.
December,	191	4.			ç	1,229	\$29 00	-
January,	191	15.			-	-	-	_
February					37	121	204 00	\$33 00
March,			٠.		1,630	16,877	16,909 00	47,792 00
April, .					763	21,640	12,889 00	60,203 00
Мау, .					283	7,047	4,227 00	23,440 00
June, .					119	684	1,306 00	8,150 00
July, .					16	56	130 00	10 00
August,					6	10	27 00	18 00
September,					19	14	98 00	25 00
October,					47	191	262 00	142 00
November,					79	520	702 00	1,260 00
Totals,					3,008	48,389	\$36,783 00	\$141,073 00

Types of Land burned Over (Acres).

										1914.	1915.
Timber,									.	3,001	3,817
Second gro	wth,									9,016	6,749
Second gro	wth,	not	merc	hant	able,					7,943	9,107
Brush,							٠			11,645	14,681
Grass, .										3,510	8,128
Not classif	fied,								-	4,860	5,907
Totals,								۰		38,975	48,389

Types of Classified Damages.

						1914.	1915.
Standing trees, .					.	\$50,697 00	\$73,782 00
Lumber, logs, cordw	ood,					14,427 00	23,544 00
Buildings, bogs, etc.	., .		4			3,530 00	31,904 00
Bridges, fences, .					.	331 00	1,936 00
Not classified, .						26,404 00	9,907 00
Totals,					.	\$95,389 00	\$141,073 00

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST SIX YEARS.

	YE	AR.		Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910, .				1,385	42,221	\$23,475	\$205,383	30.46	\$148 29
1911, .				2,356	99,693	47,093	537,749	39.31	226 24
1912, .				1,851	22,072	20,219	80,834	11.92	43 67
1913, .				2,688	53,826	35,456	178,357	20.02	66 35
1914, .				3,181	38,975	48,750	95,389	12.25	29 98
1915, .				3,008	48,389	36,783	141,073	16.08	46 90

CLASSIFIED CAUSES OF FOREST FIRES FOR THE PAST FOUR YEARS.

	19:	12.	19:	13.	19:	14.	19	15.		
Causes.			Num- ber.	Per Cent.	Num- ber.	Per Cent.	Num- ber.	Per Cent.	Num- ber.	Per Cent.
Unknown, .			649	31.1	650	24.2	1,174	37.0	1,134	37.7
Railroad,			640	34.6	913	34.0	830	26.0	777	25.8
Burning brush,			93	5.0	148	5.5	196	6.2	439	14.5
Hunters, smokers,			223	12.0	386	14.3	520	16.4	5	.1
Steam sawmills,			8	.4	6	.2	8	.1	129	4.2
Children,			79	4.3	109	4.1	140	4.4	161	5.3
Miscellaneous, .			159	8.6	476	17.7	318	9.9	363	12.4
Totals, .			1,851	100.0	2,688	100.0	3,181	100.0	3,008	100.

Precipitation in Inches for the Years 1911, 1912, 1913, 1914 and 1915, with December of Previous Year.

	Mo	ONTH	s.		1911.	1912.	1913.	1914.	1915.	Normal
December,					3.24	2.59	5.73	3.66	4.56	3.74
January,					3.07	3.87	3.21	4.30	7.38	4.12
February,					3.20	2.24	3.77	3.52	4.30	3.97
March,					3.27	5.26	5.32	4.20	.06	4.34
April, .					2.86	4.05	4.73	5.51	2.44	3.46
Мау, .					.89	4.03	2.85	2.95	2.01	3.37
June, .					4.76	.53	3.20	1.75	1.43	3.07
July, .					4.55	4.16	2.00	3.38	9.52	3.65
August,					6.70	3.85	3.30	4.59	4.83	3.70
September,		·			3.36	1.71	2.77	.45	.74	4.36
October,		. 1			3.01	1.52	7.62	2.03	3.11	4.13
November,					5.71	3.45	2.70	3.06	2.47	3.96
Totals,					44.62	37.26	47.20	39.40	42.85	45.87

RAILROAD FIRES.

Our railroad fire reports show 777 railroad fires, as follows: Boston & Albany, 156; Boston & Maine, 261; Central Vermont, 58; and New York, New Haven & Hartford, 302, burning over 7,543 acres, with a cost for extinguishing of \$7,782 and a damage of \$32,624. Owing to the severe drought during the spring this damage exceeds that of former years, while the number of fires remains practically the same.

The reports received from our locomotive inspectors show 901 inspections made of front-end screens and ash pans, with the following results:—

Boston & Albany, 101 locomotives inspected, 25 of which were defective; Boston & Maine, 321 inspected, of which 39 were defective; New York, New Haven & Hartford, 479 inspected, of which 87 were defective. In nearly all instances these were but minor defects and were promptly repaired.

The following reports from Mr. Ryder of the Boston & Maine, and Mr. Chas. B. Rood of the New York, New Haven & Hartford, show work accomplished by these roads during the year:—

Mr. M. C. HUTCHINS, State Fire Warden, Boston, Mass.

DEAR SIR: In accordance with your request for a statement of our work during the past season, we beg to submit the following:—

With the passing of February the ground was left frozen and dry without a vestige of snow, and March was ushered in with severe winds which continued during that month. When a fire started in the grass, the wind was so strong that much larger areas than usual were burned over before help could be summoned. and consequently our troubles were increased. During that month we had reports of 1,024 fires on the whole system, a larger number than any previous March of which we have record. It came upon us so suddenly that our patrol cars were not in readiness, and undoubtedly the number of reports of fires was increased on that account; but in April, May and June the number of fires was materially decreased compared with the same months during 1914 and 1913, which was undoubtedly due in large measure to the fact that our patrol cars were in working order. The weather during the months of July, August, September, October and November was such that very few fires were reported. In July, for instance, we had only 7 reports of fires on the system; in August, only 13; in September, only 19; in October, only 20; and in November, only 78, and this was quite different from previous years.

Regardless of the weather conditions, it is our belief that owners of property along our lines are taking greater interest in fire prevention, and are endeavoring at least to do a little to keep inflammable material from their property; then, again, the prompt service rendered by the lookout men in discovering fires and summoning help is of immense value.

We have added seven patrol cars to those already in service, and hope to have our patrol service in good working order, to start in March 1 next, if necessary, to follow trains. We feel confident that this method of watching for fires is the very best, and if nothing goes wrong we hope to show a material increase in good results next year.

In addition to our regular weekly inspections of spark arresters and ash pans on our locomotives since March 1, 1915, we have requested special inspections of 564 locomotives reported as setting fires, and of this number only a few were discovered with defects which might prove troublesome. In this connection permit me to state that our motive power department is very particular to report even minor defects in inspections of these devices.

Since the 1st of last March we have secured five permissions of owners of land adjoining our property in Massachusetts to clear back a strip of land as large as possible along our right-of-way fence, and in addition we have been taking care of property for which we had permission to clear up since the department was organized in 1912. We are sure that the law which took effect Jan. 1, 1915, making operators clear the brush from the right of way for a distance of 40 feet, is showing good results; often the operators do more than clear it just this distance.

We believe that all our employees are more alert than ever before in the interest of fire prevention. We hope that you have noticed, in your travel on our lines in Massachusetts, an improvement in the condition of things around our buildings.

Of course the test of our work is best shown in a dry season, but notwithstanding weather conditions last summer, we believe our efforts are showing good results in the reduction of fires from sparks from locomotives.

Yours truly,

E. A. RYDER, Commissioner.

Boston, Mass., Dec. 20, 1915.

Mr. M. C. Hutchins, State Fire Warden, 6 Beacon Street, Boston, Mass.

Dear Sir: — Complying with your request of even date, I give you below the amount paid out for cleaning up our right of way and outside of right of way for fire protection, from Jan. 1 to Nov. 11, 1915, between the following points: —

Buzzards Bay to Brewster, .								Miles. 35.06
· ·								
								3.36
Harwich to Chatham,	• .	•			• *	7.	•	7.08
Tremont to Fairhaven, .		•.	•					19.97
Middleborough to Myricks, .		. •		٠.				7.32
Middleborough to Plymouth,								15.85

All of the above sections have been cleared, with the exception of three or four places on the Tremont to Fairhaven branch, at a cost of \$4,749.90 for a total mileage of 88.64.

You understand that we have burned over all of our right of way with section men, and if you will look up your reports you will find that from Jan. 1 to Nov. 1, 1915, fires in Barnstable County were very few, and the damage slight.

Yours truly,

C. B. Rood, General Fire Claim Agent.

Appropriation for Prevention of Forest Fires. Appropriation for 1915, \$28,000 00 Receipts: — For equipment from towns and cities, 896 02 For fire towers: — Attleboro, 100 00 Carver, . 150 00 Framingham, 100 00 Grafton. 75 00 Great Barrington, 150 00 Middleborough, 150 00 Amount carried forward, . \$29,621 02

Amount brought forward,					\$29,621	02	
For fire towers — Con.							
Norton,					50 (00	
Rehoboth,					100 (00	
Sudbury,					100 (00	
Taunton,					100 (00	
Upton,				٠	75 (00	
Wayland,					100 (00	
Westborough,					100 (00	
Weston,					100 (00	
Westport,		• , '	•		150 (00	
Boston & Maine Railroad, .					3 3	35	
New York, New Haven & Har	tford	Ra	ilroa	d			
					4	10	
					1	18	
Samuel Cabot, Inc.,					18 (00	
Ford Motor Company, .					50 (00	
New England Telephone and T	'elegi	aph	Con	1-			
pany,					3 4	42	
M. E. Lyons,					12	00	
							\$30,587 07
Expenditures: —							
Pay roll,					\$15,686	40	
Traveling expenses,					5,242	56	
Stationery and postage, .					178	01	
Printing,	•				725	64	
Printing, Equipment and supplies, .					2,110	36	
Construction,					4,492	07	
Construction, Freight, express and teaming,					602	28	
Telephone,					1,440	78	
Sundries,					107	87	
				Bildening			30,585 97
Balance returned to treasur	ry,						\$1 10
Reimbursement for fire-fighting	appa	aratu	is to	tow	vns, .		\$1,806 11

FOREST-FIRE EQUIPMENT.

Under an act of the Legislature, passed in the spring of 1910 and amended in 1914, appropriating \$5,000 annually for forest-fire protection, towns with a valuation of \$1,750,000 or less are entitled to 50 per cent. reimbursement on all forest-fire equipment they desire to purchase not exceeding \$500, no town being allowed an amount exceeding \$250. All forest-fire equipment purchased under this act is approved by this department, and placed under the supervision of the town forest warden, subject to inspection at all times by the State Fire Warden or the district forest wardens.

We have at the present time 162 towns that come within the provisions of this act. Of these, 43 have purchased equipment this year, being reimbursed \$1,806.11. This equipment consists of extinguishers, pumps, shovels, rakes, wire brooms, wagons and motor trucks. Many towns, seeing the importance of getting to a fire promptly and extinguishing it in its incipiency, are purchasing motor-drawn vehicles equipped with extinguishers, pumps, etc., for this purpose. These are giving general satisfaction, and have been a great saving to many towns in not only reducing the fire loss, but have also reduced the expense of extinguishing fires very materially.

As there is an unexpended balance in this appropriation some years, it seems advisable that we ask the next General Court to amend this law, allowing the use of the balance for the purchase of forest-fire trucks equipped for handling large forest fires, and located with our district forest wardens, as we have many instances each year where we are called upon to assist in extinguishing forest fires, and at the present time we have no equipment whatever for this purpose. A portion of it could also be used to good advantage in protecting our State reservations by purchasing equipment for use on them and by making necessary fire lines.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT.

Towns.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire brooms.	Wagons.	Reimburse- ment.
Acushnet, .	1	10	18	-	-	-	4	1	-	-	-	21, 3	\$250 00
Ashburnham,	-	-	8	-	-	-	-	-	-	_	-	-	25 00
Ashby, .	-	-	48	-	-	-	2	2	-	6	-	-	154 70
Ashfield, .	-	-	33	-	-	-	-	-	-	-	-		99 00
Ashland, .	-	24	10	-	-	-	12	8	-	6	24	-	85 78
Auburn, .	-	-	83	-	-	-	_	L-I		_	_	-	249 00
Avon,	-	10	-	-	_		12	-	-	-	-	-	9 90
Becket, .	-	14	16		-	, -	L -I	2	-	-	24	-	79 50
Bedford, .	1	14	24	-	-	-	-	-	-	-	-	1 2	249 67
Belchertown,	-	-	46	-	-	-	-	1	-	-	_	11	211 87
Bellingham,	-	22	23	-	-	-	6	-	· -	8	-	11	124 12
Berkley, .	-	36	24	-	-	-	-	-	-	-	_		162 00
Berlin, .	2	10	38	-	-	1	12	-	3	12	I - I	11	. 241 45
Blandford, .	6	1	16	-	-	-	3	3	-	-	12	-	83 17
Bolton, .	-	14	33	-	-	-	6	-	-	6	-	-	126 65
Boxborough,	1	12	30	-	-	2	-	-	3	4	3	11	182 80
Boxford, .	-	-	16	-	-	-	-	-	-	-	-	-	45 60

¹ One-horse,

² Two-horse.

^{*} Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Continued.

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Towns.	Ахев.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire brooms.	Wagons.	Reimburse- ment.
Boylston,	-	-	66	-	-	-	24	-	-	28	-	- 1	\$243 61
Brimfield,	-	10	36	-	-	-	-	-	- 1	-	-	-	119 25
Burlington,	-	-	20	-	-	-	-	-	- 3	-	-	-	100 00
Carlisle,	2	15	19	-	2	-	6	-	1	6	12	12	250 00
Charlton,	-	-	77	-	-	-	40	-	-	800	-	-	250 00
Chatham,	2	15	11	-	2	3	4	-	3	5	-	11	152 98
Chester,	-	37	15	-	-	-	-	5	-	-	12	11	156 97
Chesterfield, .	-	-	25	-	-	-	-	-	-	-	-	-	75 00
Cummington, .	-	-	19	-	-	-	-	-	-	-	-	-	102 12
Dana,	-	-	6	-	-	-	-	-	-	-	-	13	250 00
Dighton,	5	8	26	-	1	-	-	-1	5	2	30	21	242 89
Douglas,	-	75	50	- 1	-	-	-	-	-	-	-	-	180 25
Dunstable,	2	25	10	-	1	-	4	-	3	6	15	11	110 69
East Longmeadow,	2	Н	18	H	2	-	12	1	-	4	-	11	153 96
Edgartown, .	2	5	10	-	2	3	4	-	3	5		11	152 17
Enfield,	I-I	20	27	II-I	-	-	-	-	-	-	H	-	85 87
Erving,	Н	E	25	6	-	-	-	-	I -I	18	-	-	86 52
Essex,		24	12	-	-	-	-	-	-	-		-	37 80
Florida,	-	-	8	-	-	-	-	-	-	Ŀ	-	-	26 00
Freetown,	Н	24	20	-		-		2		72	-	-	167 48
Georgetown, .	-	54	54	-		-	II-I	-	6	12	-		196 48
Gill,	-	5	20	-	-	-	II-I	-	-		-	-	65 00
Goshen,	-	12	58	-	-	-		-	-	-	-	-	244 05
Granby,		12	12	-	-	-		1	-	-	-	-	39 90
Granville, . ,	-	10	22	-	-	-	II-l		-	-	-	21	203 50
Greenwich,	-		18	-	II-	-	I-I	-	-	-	-	- 1	60 45
Groveland,	-	8	12	-		-	L-I	-	3	12	-	-	51 05
Hadley,	_		15	-	I-	-			-	-	-	- 1	75 00
Halifax,	-	12	64	-	-	-	12	-	-	18	-	11	241 91
Hampden,	-	-	24	-	-	-	24	-	6	16	õ	-	89 06
Hancock,	-	9	-	-	-	-	-	2	-	-	6	-	14 37
Hanson,	_	6	24	-	-	-	6	-	-	5	-	21,8	250 00
Harvard,	2	7	29	-	2	3	-	-	3	12	-	1:	250 00
									1]	1		

¹ One-horse.

³ Two-horse,

³ Motor truck.

Inventory of Equipment purchased under the Reimbursement $\operatorname{Act} - \operatorname{Continued}$.

				ACI		Coni	orowo						
Towns.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire brooms.	Wagons.	Reimburse- ment.
Harwich,	-	_	10	_	-	1-1	_	2	_	_	_	-	\$48 50
Holbrook,	-	12	21	-	_	-	-	1	-	-	24	-	124 25
Holland,	-	-	8	-	-	-	-	-	-	-	-	-	25 00
Hubbardston, .	-	-	52	-	-	-	18	-	-	4	L-	-	175 75
Kingston,	-	-	24	I - I	-	-	-	-	_	-	-	2 1	108 00
Lanesborough, .	2	5	-	-	3	-	-	3	6	6	48	11	97 25
Leverett,	2	20	16	8	2	4	-	2	4	18	1-	21	160 17
Littleton,	-	II-I	6	-	-	-	-	-		18	I -	-	34 87
Leyden,	16	10	10	17	-	-	-	-	4	8	I - I		31 55
Lunenburg, .	2	36	10	-	2	3	4	-	3	29	I -	11	160 37
Lynnfield,	-	35	20	-	-	-	-	10		-	6	2 1	249 95
Mashpee,	6	24	25	-	-	-	12	_	-	12	-	11	157 12
Mendon,	-	24	21	-	-	-	-	-	-	-	42	11	173 97
Merrimac,	-	1-	15		-	-	-	-	Н	-	-	-	75 00
Middleton,	-	12	16	6	2	-	-	_	-	5	-	-	157 69
Millis,	-	-	8	-	-	-	-	-	-	-	-	1:	242 00
Monterey,	-	-	-	-	-	-		3	-	-	12	-	15 25
New Ashford, .	-	-	-	-	-	-	-	4	-	I -	4	-	18 25
New Braintree, .	-	_	37	-	-	-	_	_	-	-	-	-	120 97
New Salem, .	-	55	20	-	-	-	-	-	-	-	-	-	100 50
Newbury,	-	-	6	_	-	-	-	8	-	-	12	-	55 90
Norfolk,	-	-	18	-	-	-	-	-	-	-	-	-	99 00
North Reading, .	-	-	38	-	-	-	-	-	-	-	-	11	248 43
Northborough, .	-	-	25	-	-	-	-	-	-	-	-	-	102 37
Norwell,	6	-	32	-	-	-	12	-	_	12	-	11	250 00
Oakham,	-	12	31	-	1	1	6	-	3	3	-	11	226 97
Otis,	-	5	10	-	-	-	-	-	-	-	-	_	62 50
Paxton,	3	-	28	12	-	-	-	-	-	6	-	_	105 87
Pelham,	-	-	19	-	-	-	-	5	-	-	-	_	84 12
Pembroke,	-	-	31	-	-	-	60	-	-	-	-	1:	250 00
Petersham,	2	10	36	-	2	3	4	-	3	5	-	11	248 05
Phillipston, .	-	36	38	-	-	-	-	1	-	-	-	_	130 15
Plainfield,	-	-	15	-	-	-	-	-	-	-	-	-	82 [50
					1	1	1		- 1				

¹ One-horse.

² Two-horse.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Continued.

	_													
Towns.	ł	Ахев.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire brooms.	Wagons.	Reimburse- ment.
Plainville, .		2	10	22	-	2	3	4	-	3	5	18	11	\$225 00
Plympton, .		-	-	-	-	-	-	-	12	-	-	-	-	20 93
Prescott, .		-	100	10	-	-		-	-	-	-		-	58 03
Princeton, .		-	32	80	-	-	-	-	-	-	-	-	-	249 20
Raynham, .		3	46	30	-	В	3	12	-	9	15	-	31	222 23
Rehoboth, .		-	10	48	-	1-	-	-	-	-	-		11	250 00
Richmond, .		-	15	31	-	-	-	4	-	-	12		-	109 20
Rochester, .		-	24	60	-	-	1-	-	-	H	30	1-	-	205 37
Royalston, .	٠	3	20	32	30	2	2	12			42	-	21	250 00
Russell, .		-	7	39	-		H-	-	-	-	-		11	220 25
Rutland, .		-	12	18	-	-	-	В	-		-	-	1:	250 00
Salisbury, .		3	-	27	-	6	-	24	-		6		-	140 87
Sandwich, .		22	12	36	-	-	2	-	-		24		11	245 60
Shelburne, .		I-I		50	-	-	-	-	-	12	6	-	11	186 87
Shirley, .		I-I	48	36	-	-	-	-	-	-	-	H	-	139 50
Shutesbury,		-	28	25	-	-		23	-	-	6	-	-	101 25
Southampton,		-	-	-	-	-	Н	-	1		-	12	-	8 75
Southwick, .			12	26		Ы	I-I	-		-	-	-	11	101 50
Sterling, .		-	-	25	-	Н	1-1	-	1	-	-	18	12	241 12
Stow,			-	42		-		-			18	1-	-	131 31
Sturbridge, .		,-	11	35	-	_	Ы	_		-	-	I - I	-	116 45
Sudbury, .			-	40	-	1-	Н	-	-	-	-	-	-	250 00
Sutton, .			50	50	24	-	-	-	-	32	24	_	-	188 46
Tewksbury,		2	-	24	-	2	-	-	-	-	30	-	11	174 00
Tolland, .		1-1	-			-		_	4	-	-	B	-	18 26
Townsend, .		H	-	46	-	-	I-J	_	-	-	-	-	-	250 00
Tyngsborough,		_	220	20	-	_	-	_	54	12	24	36	_	250 00
Tyringham,		2	10	30		2	_	10		2	3	-	1 2	144 80
Upton, .		-	-	30	L	-	-	_	-	-	_	12	11	235 28
Wales,		2	-	40	12	2	2	2	-	-	6	-	11	241 99
Warwick, .	٠.	_	6	10	_	-	-	_	-		-	-	11	154 35
Washington,			-	15	3	1	1-	10	-	-	8	-	11	105 32
Wendell, .		-	38	27	-	2	-	12	-	-	18	_	11	163 24
	-								1					

¹ One-horse.

² Two-horse.

Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT — Concluded.

Towns.	Ахев.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovela.	Wire brooms.	Wagons.	Reimburse- ment.
West Boylston, .	-	-	107	-	-	-	-	-	-	-	-	-	\$250 00
West Bridgewater,	-	-	20	-	-	-	-	-	-	-	-	11	250 00
West Brookfield, .	-	12	37	-	-	-	-	-	-	-	-	-	121 75
West Newbury, .	-	8	13	-	-		-	3	-	-	18	-	87 12
Westhampton, .	-	-	16	-	-	-	-	-	-	-	-	-	48 00
Westminster, .	-	77	48	24	-	-	24	-	-	24	-	-	244 09
Wilbraham, .	-	27	32	-	-	-	23	-	12	6	-	-	118 38
Wilmington, .	-	12	40	-	1	-	-	18	-	34	-	-	187 38
Windsor,	-	-	40	-	-	-	-	-	-	-	-	-	200 00
Worthington, .	2	15	10	-	-	3	-	-	-	5	-	11	86 01
Wrentham,	-	12	30	-	-	4	-	II-	-	-	-	11	250 00
Totals,	108	1,728	2,361	142	50	42	475	158	144	775	401	61	\$18,818 67

¹ One-horse.

Towns receiving Fire-equipment Reimbursement during Year 1915.

	_	 			_		 		
Ashby, .			\$39 00	Leyden,				\$9	20
Ashland, .			7 87	Littleton, .				34	8
Belchertown,			36 00	Mashpee, .				32	3
Bellingham,			1 20	Mendon, .				3	7
Blandford,			23 37	Middleton,				108	1
Bolton, .			19 50	Monterey,				15	2
Brimfield,			19 50	New Ashford,				, 18	2
Carlisle, .			2 28	Oakham, .				4	0
Chester, .			59 95	Plainfield,				82	5
Cummington,			37 62	Prescott, .				9	8
Dana, .			231 25 -	Richmond,				23	0
Dighton, .			125 10	Royalston,				104	9
Douglas, .			5 25	Salisbury,				102	0
Dunstable,			4 55	Shutesbury,				13	7.
Enfield,			84 37	Southampton,				8	7.
Georgetown,			2 40	Tyringham,				32	5
Granville,			73 50	Wales, .		٠.		5	2
Hampden,			50 06	Washington,				18	4
Hancock, .			14 37	West Bridgewat	er,			49	8
Harwich, .			40 00	West Newbury,				18	3'
Holbrook,			55 25				-		_
Kingston,			108 00	Total,				\$1,806	1
Lanesborough,			70 75						

FEDERAL CO-OPERATION.

The co-operative work carried on between this State and the Federal department has been very satisfactory. We were allowed \$2,500 from the Weeks law fund for the protection of the watersheds within the State. This was expended in payment of the observers throughout the State, covering a period of ten weeks. I anticipate that this appropriation will be increased next year, owing to the cost of maintaining the co-operative observation towers established along the State boundary lines.

Each forest warden was furnished with a supply of cloth fire-warning notices, giving extracts from the forest-fire laws. These were posted in conspicuous places in each town, 10,000 copies being used through-

out the State.

In conclusion I desire to say that the loyalty and enthusiastic co-operation of all the employees of this branch of the department during the past season is heartily appreciated.

Respectfully submitted,

M. C. Hutchins, State Fire Warden.

THE BROWN-TAIL MOTH SITUATION.

The brown-tail moths have been far less in evidence throughout the State the past year than during any year since they became a pest here. No one condition is to be held responsible for this state of affairs, probably, but a fortunate combination of occurrences. The fungous disease of the brown-tail larva has been one of the very effective agents in lessening the numbers of this insect. This disease has recurred each year in nature, and where it appears sweeps the moths off almost to annihilation. During two seasons we were able to produce the disease artificially in the laboratory, and thereafter it was methodically placed in every badly infested section of the State with pronounced success. The two years succeeding, however, we were unable, for some unaccountable reason, to reproduce our previous results, although at greater pains and expense. These same seasons, however, we found the disease reproducing itself in nature and equally effective.

Undoubtedly, the imported parasites have very materially aided the situation in destroying a goodly percentage of these insects.

Late summer and early fall spraying have been practiced

with very beneficial results in some of our worst infested divisions.

During the past summer the flight of the brown-tails was so slight as to be scarcely noticed in many cities and towns,—a great contrast to the flight of previous years, when it was almost an imitation of a snowstorm in summer, so thick were they about the electric lights. It is altogether too early for us to prophesy as to the future of this moth pest, but let us hope that whatever the cause of the reduction in numbers is, it will continue its good work.

The splendid results of moth-forestry work about our inland lakes and streams, where the white oaks in particular were thinned out and then the remaining trees sprayed, have been the means of making the cottages, heretofore deserted owing to this irritating insect, again habitable.

USE OF BURLAP DISCARDED.

Burlapping trees for the gypsy moth, which a few years ago was in common use, such quantities being used that it was purchased by the carload, has practically been discarded as an economic method in moth control. A bale or two constituted our entire purchase the past season. The burlap bands over trees were never intended to furnish anything other than a place for the larvæ, or worms, to crawl under as a protection. Taking advantage of this natural habit these bands were so attached that they could be turned up and the insects destroyed. While the burlap was not in itself very expensive, the work of inspecting during the season was burdensome. The bands were sometimes put on and then never turned, in which case they protected rather than hindered the development of the insects.

It was found that the same amount of expense put into spraying with arsenate of lead was more effective and more sure of results.

Burlap may still be used effectively in a newly infested section like the western part of the State, but even here tanglefoot would perhaps be better. For the badly infested section of the State, however, it is not advised, and has been discarded generally as being impracticable.

LARGE HIGH-POWER SPRAYERS.

The gigantic undertaking under the direction of this office, which involves the saving of the foliage on hundreds of miles of streets, public thoroughfares, parks, woodlands and estates throughout eastern Massachusetts, requires not only modern high-power sprayers of the latest design, but thorough and efficient planning to accomplish results. The spraying season lasts but about six weeks, and rainy weather, poor spraying material, broken-down machinery, labor troubles and drought or lack of water are a few of the difficulties that it may be necessary to surmount during any spraying season.

A few years ago most of the spraying equipment was made of cast-iron construction, but now the more important bearings and parts are made of metals guaranteed to withstand wear.

Towns and cities with tall and handsome shade trees that they care to preserve need, by all means, to own one or more modern high-power sprayers.

The large high-power sprayer originally perfected and brought into use by the State Forester's department is the standard machine still in use.

This department continues to build its own machines of this character, although they are assembled for us at a price less than it cost us when it was done by our own mechanics. The State does not sell these machines; they are simply used in our co-operative work with towns and cities under the moth law.

SMALL POWER SPRAYERS.

Several makes of small power sprayers are on the market at the present time which are proving very valuable for certain kinds of spraying. It is a mistake, however, to entertain the idea for a moment that these small machines can perform the function of the modern high-power sprayer.

A few years ago there were but two units in spraying,—the large sprayer and the hand-pump barrel outfit. The latter was used by the local moth superintendent as an auxiliary in his work, and where it was impossible to meet the demands for spraying on estates and in badly infested places with the

large machine, a crew of two or three men with a barrel pump could be put to work independently. As a matter of fact, many towns depended entirely upon this type of spraying alone.

The question of efficient labor and the scarcity of it began to make spraying by hand expensive; also farmers and fruit growers even found hand spraying too laborious and expensive a proposition, and they are gradually turning to the small-power outfits which are very popular and practical. A 1½ to 2 horse-power machine saves the manual labor of pumping. Much time is saved, as the engine does not stop for rest. These machines are easily transported, economical of the spraying solution, within the means of any average farmer or fruit grower, economical of labor, and can be used even in spraying the larger trees by climbing. They throw a very fine mist spray from which satisfactory results are obtained. A farmer can spray his fruit trees independently and at the psychological moment if he has one of these outfits.

These same sprayers are being used more or less also by towns and cities. Many moth superintendents do practically all of the private work in their towns, and while their larger machines are busy spraying, a great amount of work that is self-supporting, so-called rush orders, can be attended to by these small auxiliaries.

A small 4 horse-power sprayer was placed upon the market last year that has apparent merit, particularly where the trees are not tall, as in many Cape Cod towns. This machine is modeled after the high-power State machine, and from last year's experience with it, is to be recommended.

THE AUTO TRUCK IN STATE FORESTRY WORK.

This department built an auto-truck sprayer for use in the North Shore moth work, and it has been in constant demand since. The first cost seemed great, but the fact that with this machine a large portion of the highways have been sprayed over the North Shore, thereby saving the expense of many more horse-drawn machines, makes it at once apparent that the final cost is not excessive. This power machine saves a great amount of time over a horse-drawn sprayer in that when once emptied it can quickly be replenished from the water



A pasture at Chelmsford that should be reforested.



A young plantation of white pine on similar land as above, at Royalston. Ideal white pine land.



supply. The saving is not only one of horse hire, but of labor, as the same number of men can cover a far greater territory with the truck. It is believed that our State highways could be handled more economically and with more satisfactory results were we to provide auto-truck spraying outfits for the work.

These sprayers are so constructed that the tank and pump-which are made in one piece can be detached and then the truck may be used as a regular auto truck. We use our present truck throughout the remainder of the year for every kind of work. It has occurred to the writer that with a little further adaptation these same trucks may be used for an auxiliary forest-fire equipment. It has been thought that eventually we may have an auto truck in each district of the State where it could be used for spraying during the season, and then as a forest-fire reserve equipment for the remainder of the year. This extra equipment is just the thing needed in many rural sections, particularly when the local apparatus is not very pretentious. This equipment could cover territory with a large radius, and would prove very effective.

Besides the State Forester's auto-truck sprayer outfit, similar equipment has been purchased by the State Water and Sewerage Board and the town of Canton; also the United States Department of Agriculture is building an outfit for the Bureau of Entomology for use in New England on the moth work.

PARASITE WORK.

The following report was kindly furnished by Dr. L. O. Howard, chief of the Bureau of Entomology, upon request for a comprehensive statement of the present condition of this work. His correspondence is published in full, as it gives just the information desired.

WASHINGTON, D. C., Dec. 1, 1915.

DEAR PROFESSOR RANE: — In accordance with your request and with my annual custom I am writing you concerning the condition of the parasites of the gypsy moth and brown-tail moth which have been imported into New England by this Bureau in co-operation with the State of Massachusetts and other official organizations and individuals in foreign countries and at home.

The statement which is enclosed, and which I trust you will have printed in quotation marks, has been drawn up by Mr. A. F. Burgess of this Bureau, in charge of our work against the gypsy moth and brown-tail moth. It will be noted in the opening paragraph that during the year no parasites have been introduced from abroad. This has been largely due to war conditions in Europe. So soon as matters become settled over there it is my hope to send one or more expert assistants to certain countries in the effort to rear and to introduce into the United States certain additional parasites which we know to exist, and some of which have already been imported but have not become established in this country. A study of the notes made at the laboratory at Melrose Highlands, Mass., indicates that some 29 species of the natural enemies of the gypsy moth and browntail moth have been imported from time to time, and that 12 of these species have been established. The establishment of the remaining 17 has either failed or is doubtful. There remains a possibility that some of them may be recovered at a later date, but this is entirely problematical. Of the 12 which have become established, at least 7 seem to have been doing very efficient work during the past year, as will appear from Mr. Burgess's more detailed statement.

Mr. Burgess has mentioned in his report the destruction of a certain percentage of the Calosoma beetles by skunks and other agencies. The striking appearance of this beetle renders it easily recognizable, and it is feared that in its increasing abundance it may be heedlessly destroyed by ignorant people or largely collected by ardent and unscrupulous collectors. The Bureau has, therefore, as you know, issued a series of posters and cards calling attention to this and other important enemies of the gypsy moth and the brown-tail moth, in order to prevent this destruction in some measure at least. It seems to me especially desirable that the Boy Scouts of New England should be able to recognize these beneficial insects, in order that this information may be carried into the homes in general. Is it not possible, also, that the Boy Scouts might be utilized in some way in the warfare against these two species of injurious insects?

Yours very truly,

L. O. Howard, Chief of Bureau.

STATEMENT OF MR. A. F. BURGESS.

During the year 1915 no parasites of the gypsy moth nor the browntail moth have been introduced from abroad, and conditions have been such that it has been impracticable to attempt to carry on observations on these insects in their native home, or to collect material there for study or investigation. The summer of 1915 was unusually cool, and precipitation was heavier than has been recorded for many years. These two factors, namely, temperature and humidity, have undoubtedly had their effect on reducing the activity of parasites as well as curtailing the rapid development of the wilt disease, which is a prominent factor in reducing gypsy moth infestations.

An attempt has been made during the year 1915 to liberate colonies of parasites in as much of the infested territory as possible outside of the area where these beneficial species were known to exist. During the spring extensive work was carried on with Anastatus bifasciatus, one of the egg parasites of the gypsy moth. From a colony of this insect which was liberated a number of years ago near West Peabody, Mass., it was possible to collect large numbers of parasitized gypsy moth eggs. Between 9,000,000 and 10,000,000 of parasitized eggs were obtained in this region, and colonies were liberated in Maine, New Hampshire and Vermont. In all, 91 towns were colonized, 65 of which were in Massachusetts. The species is now quite well distributed in Massachusetts, but further colonizations will be necessary, particularly in the southern part of the State. It is hoped that enough parasites may be secured this winter so that the remaining towns which are badly infested with the gypsy moth can be colonized during the spring of 1916.

The other parasite which attacks gypsy moth eggs, namely, Schedius kuwanae, has been colonized during the last part of the present year in many towns in Massachusetts, particularly in the southern part of the State. At the present time colonies have been liberated in nearly all the towns where infestation is at all severe.

During the winter of 1914-15 collections of brown-tail webs secured from certain localities showed quite heavy mortality of the caterpillars in the webs. The number was not as great as during the previous year and in some sections mortality was extremely low. Apanteles lacteicolor, one of the parasites of this caterpillar, was found more abundantly than during the spring of 1914. This parasite seems to be increasing in number at present, after suffering a severe decrease last year. Meteorus versicolor is also increasing, and has been found in sections, many miles from points where colonies have been liberated. These two species have already spread into nearly every town in Massachusetts which is infested by the gypsy moth and the brown-tail moth, so that further colonization is not deemed necessary at present.

Another species of Apanteles, which is known as Apanteles melanoscelus, and which is a parasite of the gypsy-moth caterpillars, is increasing in the region around Melrose, where it was originally liberated. It was possible to collect enough specimens so that three colonies of 500 each were liberated this year. One was placed in Manchester, N. H., and the others at Middleborough and Harwich, Mass.

Compsilura concinnata has been abundant in some localities, but does not seem to be generally distributed over the territory, although it has been found during different years in nearly every infested section. It is interesting to know that several species of Tachinid parasites, which have heretofore simply maintained themselves without increasing to any great extent, have been recovered in greater numbers than ever this year, and in some cases they have been obtained many miles from the nearest colony that was liberated. This refers particularly to Blepharipa scutellata, a parasite of the gypsy moth, and to Zygobothria nidicola, which attacks the brown-tail moth.

The Calosoma beetle (Calosoma sycophanta) has been slightly more abundant this year than heretofore. Its activities have not been quite as noticeable in all cases on account of the cool weather, which had a tendency to keep the beetles in seclusion. In some areas heavy mortality among the beetles has been caused by skunks and possibly by other animals. This species has, however, maintained its good reputation as a foe of the gypsy moth.

Considering the gypsy moth infested region as a whole, there has been no decrease in the severity of infestation during the past year. As stated at the outset, the weather conditions have been unfavorable for the work of the natural enemies, and on the average, a slight increase in infestation is noticeable in many sections. Under normal conditions the effect of natural enemies will probably be more pronounced. In the case of the brown-tail moth, the infestation has been enormously reduced during the last two years. This has been brought about by several agencies, but the parasites and natural enemies have undoubtedly contributed materially.

GYPSY MOTHS AND CRANBERRY BOGS.

Perhaps the most serious new development in connection with the gypsy moth work is the invasion by these insects of the cranberry bogs. As the Cape country began to have a general infestation, reports were received indicating that they were here and there found upon cranberry bogs, but no great damage to this property from their invasion was felt until the past two seasons, particularly the last year. Cranberry growers as a whole are very businesslike, and as soon as the larvæ were found eating the cranberry vines spraying was begun and other remedial measures were taken. However, the past season's experience has demonstrated that the conditions have become so serious that the vast cranberry industry, which is of such great economic importance, has become actually threatened and demands our immediate attention. The fact that these insects readily prey upon the cranberry vines complicates the situation and brings an altogether new problem up for solution.

The State Forester has had two meetings with representatives of the Cape Cod Cranberry Association, and through his division men has been able to make a very general survey of the present conditions and the problem confronting us. The cranberry business is found to be the fundamental industry of many Cape towns, approaching as high as seven-eighths of

the assessed valuation in one town. After a close study of conditions it is believed that our present moth law contains all the elasticity necessary for dealing with the emergency, provided we have sufficient additional funds to cope with the situation.

At the present time a careful survey of the situation is being made in each of the towns, and definite estimates of the cost of doing the work are being accumulated. It is our purpose to call a public meeting at some central point like Middle-borough at an early date, at which time the whole subject may be gone into and discussed in detail by those interested. Whether the matter will demand special legislation or consideration at the hands of the General Court remains to be seen. That the problem is a serious one there is no question.

SPECIAL CO-OPERATIVE MOTH WORK.

Under this heading we include the work done on the North Shore in co-operation with the city of Beverly and town of Manchester and the residents of that section, the work done in Dover woodland in co-operation with the town and the property owners of Dover, and a new undertaking, under the name of the Sagamore Beach gypsy moth work, which we have undertaken during the last year in co-operation with the Sagamore Beach Association and property owners in that vicinity.

The North Shore work has been continued during the past year along the same general lines as in previous years, and the work has been handled in an able and efficient manner by our division superintendent, Mr. Phillips, and his assistant, Mr. Donovan. The chairman of the committee, Col. Wm. D. Sohier, expresses himself as being much pleased with the work this year. The expense of the work has been much lessened this last year owing to the fact that no thorough winter work was done in the woodland. This has resulted in the gypsy moths increasing in certain small areas, and it will be necessary to do some creosoting this year in order to prevent the spread. During the last year 2,928 acres were sprayed at an average cost of \$5.63 per acre; 524 acres were cut and burned

over at an average cost of \$9.70 per acre; 2,630 acres were creosoted at an average cost of \$1.19 per acre. The cost of this cutting and burning was very low, owing to the fact that a large amount of work was done by the so-called "unemployed" under the relief fund, which was organized last winter.

In Dover the work has progressed along the same lines as those laid down in the beginning for the work. Spraying was done during the season, the cost of which was partly paid by the owners. Much thinning has been done and the wood sold and the proceeds turned in to the fund for future work.

The work at Sagamore Beach has not been of great extent, but has been of great benefit to the summer colony there and has been largely self-supporting.

Special	North	Shore	Fund.
---------	-------	-------	-------

•	
Balance from 1914,	
Receipts: —	
William Morris,	
City of Beverly,	
Wm. D. Sohier, agent for property owners, . 5,977 21	
Town of Manchester, 3,500 00	
Wm. D. Sohier, agent, 5,000 00	
F. W. Rane, State Forester, 4,113 48	
Massachusetts Highway Commission, 46 56	
Appropriation for suppression of gypsy and	
brown-tail moths, 2,633 19	
Massachusetts Highway Commission, 120 43	
Boston & Maine Railroad,	
	\$32,764 70
Expenditures: —	
Pay roll,	
Travel,	
Supplies, 8,396 37	
Supplies,	
Stationery and postage, 25 85	
Sundries, including teaming, telephone, etc., . 1,471 54	
	25,954 40
Balance Nov. 30, 1915,	\$6,810 30

Dover	Gyp	sy N	Ioth 1	7unc	₹.		
Balance on hand Nov. 30, 191 Receipts: —	4,		٠.		\$1,061	82	
		:			1,000	00	
For tools lost,				,	,,,,,,		
Property owners, and wood so	ld,				2,338		
							\$4,401 51
Expenditures: —							
Pay roll,	٠	•	• •	٠	\$3,737		
Supplies,	٠	• .	. •	*	455		
Teaming,	•	•	•	•		00	
Maps,	•	•	•	•	. 4	50	
Stationery (time books), .	•	•	•	٠		98	4 002 01
				-			4,203 21
Balance Nov. 30, 1915,			•				\$198 30
Specia	1 So	uth S	Shore	Fun	д		
Balance from 1913,	0 20	aure 2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1 (4)0			\$66 19
Datance from 1919,	•	•	•	•		۰	φ00 19
Expenditures: —							
Supplies (arsenate of lead),					\$64	80	
Stationery and postage, .						39	
1 37				_			66 19
Balance Nov. 30, 1915,	ė						-
Sagamore 1	Beaci	$h Gy_i$	psy A	Ioth	Fund.		
Receipts: —							
E. W. Souther, agent,					\$799		
F. W. Rane, State Forester,				•	500		
Various owners, for cordwood,	•	•	•	٠	198	25	## 10W 0V
				-			\$1,497 25
Evnandituras							
Expenditures: — Pay roll,					\$806	97	
Travel,	•	. •	•	•	-	89	
Supplies,	•	•	•	•		90	
Teaming, etc.,	•	•	•			90	
Seedlings,		•				50	
50,				_			1,017 56
Balance Nov. 30, 1915,	•		•	•		•	\$479 69

REPORTS ON MOTH WORK FROM CITIES AND TOWNS.

Data from the whole moth-infested section of the State in the form of reports from each city and town are on file in the office. It has been our policy to print this information in the annual report every second or third year, and this would be the season for doing so, but as the report is already large it will necessitate its being deferred.

The following reports from the city of Boston and the town of Brookline are examples of these reports:—

Boston, Dec. 23, 1915.

DEAR SIR: — In accordance with your request I herewith submit following report on moth-suppression work for city of Boston during the year 1915. We expended almost \$45,000, of which amount \$18,000 was laid out on private estates, and the balance, \$27,000, on public work and excess liability on private work.

The general condition of the city is excellent, there being only a very light infestation of brown-tails in West Roxbury and Hyde Park sections, with a general infestation of the gypsy.

Conditions in Charlestown, East Boston, South Boston and city proper are very satisfactory, with an isolated infestation of gypsy.

Jamaica Plain, Brighton and Dorchester have a general infestation of gypsy, about 90 per cent. less than in 1910.

With our increased facilities for spraying we have been able the past two years to cover entire city; no defoliation of any kind noticed or reported. We have at present twelve Fitz-Henry high-power sprayers and one auto-truck sprayer; also four hand tubs and three Church machines to help out in case of necessity.

Our park system is in splendid condition, a great part of it being uninfested.

During the coming year we intend to cover the entire city with destruction and spray work.

Too much credit cannot be given to the State Forester's office for the courtesy and assistance rendered to me in the course of my efforts to do this work as thoroughly as possible during past years.

Very truly yours,

WILLIAM P. LONG, Superintendent of Street Trees and Moth Work.

Brookline, Dec. 22, 1915.

The following is a report of the moth work done in Brookline for the year ending Dec. 31, 1915.

The appropriation for the suppression of gypsy and brown-tail moths was \$28,450.

Last winter all the trees in the town were creosoted, and this past spring the 4,500 acres comprising the town's area were sprayed. Of this amount about 1,200 acres are woodland. The infestation of gypsy moths this fall is about 50 per cent. less than last year, and the situation can easily be controlled with an appropriation smaller for gypsy moths than last year. The flight of brown-tails was slightly larger than a year ago. These nests will be removed during January and February.

The town appropriated the sum of \$3,000 for leopard moth work. This insect is on the increase, and is by far the most serious problem the department will have to contend with in the way of tree pests for the next

few years.

The patrolling of our woodland area in the dry seasons during the spring and fall reduced the number of fires from 32 in 1914 to 7 in 1915.

The department is also trying to encourage nesting of useful birds in the town. We have placed this year 350 bird houses of various designs in roadside trees throughout the town. During the coming winter we will keep the 53 feeding stations for the birds well stocked with proper grains, etc. As yet no appreciable number of the boxes have been occupied. We hope that it will be possible to give you excellent reports on this division of the department's work during the next year.

I take this opportunity to thank you and your office for the many courtesies extended to the town during the years I have been connected with this department.

Daniel G. Lacy, Superintendent.

THE PURCHASE AND DISTRIBUTION OF SUPPLIES.

Some time during the month of December concerns handling the various supplies which we use in our work are asked to submit bids on such quantities as we may need for the ensuing year.

The successful bidder accepts our requisitions from time to time for such quantities as may be called for by the cities and towns entitled to supplies through this department, also for supplies for the nurseries and for the special reforestation work being carried on by us. When a city or town is in need of any supplies the local superintendent makes out his list, using a catalogue of supplies and shipping order furnished him by this office.

He hands this shipping order to the field superintendent, who lays out and supervises the work being done in each city and town, and knows just what supplies are needed, and therefore is held responsible for the approval of these shipping orders.

The field superintendent in turn mails the order to this office, where the requisitions are made out on the concerns from whom we purchase the supplies.

Orders for supplies for nursery or reforestation work must be approved by the assistant State forester in charge of that particular line of work.

We endeavor at all times to furnish supplies of a good grade. The following is a list of cities and towns, with amount of supplies for moth work furnished them, for the year ending Nov. 30, 1915. The amounts given are the gross amounts furnished, some of the cities and towns having made payments to the State Forester's office for all or a part of the amounts, according to the amount of their net expenditures or their class under the provisions of the law. For amounts received from this office in reimbursement and supplies see the table on page 98.

LIST OF TOWNS AND AMOUNTS OF SUPPLIES FURNISHED FOR 1915.

Third-class Towns.

					 		=
Acton, .		\$574 77	Georgetown,			\$478	16
Ashburnham,		341 88	Grafton, .			1	08
Ashby, .		264 74	Groton, .			503	71
Ashland, .		138 45	Groveland,			192	97
Auburn, .		47 30	Halifax, .			6	45
Avon, .		81 89	Hanover, .			432	79
Ayer, .		285 60	Hanson, .			148	87
Bedford, .		785 90	Harvard, .			1,015	11
Belchertown,		13 85	Holden, .			175	08
Berkley, .		16 52	Hopkinton,			65	90
Berlin, .		358 99	Hudson, .			526	35
Billerica, .		784 13	Ipswich, .			764	81
Bolton, .		590 63	Kingston,			262	64
Boxborough,		595 20	Lakeville,			79	00
Boxford, .		419 29	Lincoln, .			1,446	44
Boylston, .		108 69	Littleton, .			465	27
Bridgewater,		53 71	Lunenburg,			606	72
Burlington,		477 79	Lynnfield,			529	13
Carlisle, .		430 94	Marshfield,			152	53
Carver, .		12,630 03	Mashpee, .			437	85
Chelmsford,		733 19	Merrimac,			211	99
Dracut, .		734 64	Middleborough	9		1,075	64
Dunstable,		192 53	Middleton,			227	22
Duxbury, .		252 27	Millbury, .			1	08
Edgartown,		1 45	Newbury,			665	87
Essex, .		40 17	Norfolk, .			89	64

¹ Includes large power sprayer.

Relief fund for unemployed,

1,055 88

Third-class Towns - Con.

					1		
North Andove	r,			\$677 07	Stoneham, .		. \$881 3
North Reading	g,			820 06	Stoughton, .		. 231 5
Northborough	, .			429 91	Stowe,		. 677 2
Northbridge,				1 08	Sudbury,		. 791 3
Norwell, .				657 69	Templeton, .		. 122 9
Orange, .				1 80	Tewksbury, .		. 709 3
Orleans, .			1.	40	Topsfield, .		. 230 0
Oxford, .				1 08	Townsend, .		. 350 0
Pembroke,				549 98	Truro,		. 147 5
Pepperell,				572 47	Tyngsborough, .		. 757 9
Plainville,				43 34	Upton,		. 10
Plympton,				225 49	Uxbridge, .		. 10
Princeton,				387 33	Wayland, .		. 1,010 2
Raynham,				160 62	Wenham,		. 705 2
Rockland,				1 1,731 13	West Boylston,		. 2 668 9
Rowley, .				525 37	West Bridgewater	, .	. 402 4
Salisbury,				488 32	West Newbury,		. 11,578 5
Sandwich,				381 94	Westborough, .		. 189 1
Scituate, .				895 42	Westford, .		. 914 0
Sherborn,				372 25	Westminster, .		. 105 4
Shirley, .				298 26	Wilmington, .		. 871 1
Shrewsbury,				98 30	Winchendon, .		. 331 69
Southborough,				375 33			
Sterling, .				326 75			\$43,216 49
Andover, .				\$755 03	Methuen, .		. \$929 23
Barnstable,				1 2,862 88	Natick,		. 36 2
Canton, .				1,468 66	Newton,		. 4,372 9
Concord, .				528 23	Reading,		. 1,418 1
Danvers, .				752 16	Saugus,		. 592 89
Fall River,				92 30	Wakefield, .		. 456 63
Gloucester,				558 84	Waltham, .		. 12,614 69
Hamilton,				519 88	Weston,		. 1,862 8
Lexington,				1,310 21	Woburn,		. 219 29
Lowell, .				387 41	Worcester, .		. 1,453 80
Marlborough,							
Medford, .				803 13			
vieuroru, .				803 13 269 70			\$24,265 2
¹ Include	•			269 70	² Include	small	
¹ Inclue	les larg			269 70	² Includer	small	sprayer.
¹ Inclue	des larg	e pow	er sp	269 70 rayer.	² Included	s small	sprayer.
¹ Includation Include Automobiles,	des larg	e pow	er sp	269 70 rayer.		:	sprayer \$78 66
¹ Include Automobiles, Division supers	des larg	e pow	er sp	269 70 rayer.	* Included	s small	sprayer \$78 60 . 312 5 . 427 90
¹ Include Automobiles, Division superiorer gypsy nerost thinning	des large	e pow ent (er sp.	269 70 rayer.		:	sprayer. . \$78 60 . 312 56 . 427 96 . 253 11
'Included Included In	des larg	e pow ent (er sp.	269 70			sprayer. . \$78 60 . 312 55 . 427 90 . 253 1 5 63
	des large intendent function functions and the second seco	e pow ent (ind, cal,	er sp	269 70 rayer.		:	\$24,265 23 sprayer. . \$78 66 . 312 54 . 427 96 . 253 11 . 5 63 . 684 63 . 41 03

[Jan.

Sagamore Beach gypsy mo	th fu	ınd,					\$44	05
Special North Shore fund,					1.		5,644	76
State Forest Commission,								66
State Forester's expenses,							135	06
Supply store,							173	86
Traveling sprayers, etc.,						• 1	1,428	58
Total,				•1,			\$10,286	36

HOUSING OF EQUIPMENT.

During the past ten years the work of preserving our trees and forests from destruction by insects and forest fires has caused the cities and towns in our State to purchase more or less equipment for use in this work.

This equipment consists of spraying machinery, forest-fire wagons and all of the minor tools and equipment that go with them, such as fire extinguishers, axes, shovels, water cans, acid and soda, spraying hose, creosote brushes and many other tools of minor importance but essential to the work. Up to the present time the care of this equipment has not been what it should be in a number of cities and towns.

The State's policy has been to be generous and give as much aid as possible where it is of public concern. Both the moth law and the forest-fire equipment law encourage cities and towns in acquiring this equipment, as a part of the expense of it is shared by the State under certain conditions.

When a modern high-power sprayer has been purchased which has cost the town and State each \$600, its future value is greatly prolonged if it is properly housed and taken care of. What is true of the sprayer is true of other tools. We have gathered the data as to the methods practiced generally, and there is a great lack of uniformity.

Many municipalities have given the subject attention and either built new buildings or have remodeled and adapted old buildings for their use at small expense. Others have their town property scattered all over the town, and often are paying more rent than it would cost to properly house the equipment in a convenient central place. Nearly every town or city has headquarters for its road and other equipment. This is the natural center, where a neat shed could be constructed for the sprayers and fire wagon, and, by extending its length

15 or 20 feet, a workroom and storeroom might be added where, under lock and key, the equipment would always be safe and constantly ready for use.

A building of this kind serves to systematize the work, as a note left here will give the information as to where the official in charge can be found. On rainy days and at other times there are many things that can be attended to at these headquarters, like repairing of equipment, making out reports, painting, making an inventory of the work, etc., which otherwise would be more or less neglected.

We mention this matter here, particularly to call it to the attention of the towns and cities that should be especially interested in the housing of their equipment.

The State Forester insists that his division men personally see that all spraying machines and forest-fire equipment be put in order so as not to freeze before cold weather, etc., but as pointed out above, there is an opportunity to improve conditions in many places, and it is believed that the matter should receive the consideration of our public-spirited citizens, and be called to the attention of the authorities.

STATE HIGHWAY WORK.

Along the State highways spraying and cleaning for the gypsy and brown-tail moths and elm-leaf beetle were done under the direction of this department. Bills for this work were approved by us and transmitted to the State highway department for payment. The list of towns and cities in which the work was done is as follows:—

Work on State Highways, 1915.

Acton, .		\$202 00	Ayer, .		\$25 25
Agawam, .		28 50	Barnstable,	 :	65 84
Amesbury,		32 74	Barre, .		49 35
Amherst, .		25 00	Bedford, .		43 46
Andover, .		61 35	Bellingham,		10 20
Ashburnham,		95 25	Beverly, .		166 99
Ashby, .		43 50	Billerica, .		77 15
Ashland, .		68 88	Bourne, .		155 00
Athol, .		24 50	Boxborough,		165 90
Auburn, .		29 70	Braintree.		20 00

WORK ON STATE HIGHWAYS, 1915 — Continued.

Brewster, .	 \$ 182 25	Lunenburg,		\$83 85
Bridgewater,	 21 42	Marion,		14 00
Brookfield,	 61 22	Marlborough,		202 20
	 108 87	Marshfield,		71 21
Canton, .	 23 50	Mashpee,		21 41
Charlton, .	 20 36	Melrose,		15 40
Chatham,	 8 65	Merrimac,		33 17
	 94 35	Methuen,		64 60
Chester, .	34 25	Middleborough, .		37 37
Chicopee,	 37 50	Middleton,		11 88
Cohasset, .	 53 89	Millbury,		15 95
Concord, .	243 76	Monson,		5 64
	 11 60	Montague		22 60
	 16 20	Natick,		75 29
Dover, .	82 04	Needham,		46 40
Dracut, .	 60 10	Newbury,		63 87
Duxbury, .	 30 02	Newburyport,	•	25 26
Easthampton,	14 28	North Andover,	•	150 78
term	 16 00	North Attleborough, .		60 50
Essex, . Falmouth,	 100 45	North Reading.	•	45 00
Fitchburg.	 133 58	Northborough,		113 56
Foxborough,	94 65	Northbridge,	•	17 50
Framingham,	 110 55	Northfield,	•	75 50
Franklin, .	 40 25	Northheid,	•	75 50
	 	Norwood,	•	27 41
Gardner, .	 13 50	Oxford,	•	
Gloucester,	 51 10	Palmer,	•	57 23
Grafton, .	 97 75	Pembroke,	•	21 00
Greenfield,	 30 40	Peppereil,		8 9 89
Groton, .	 27 75	Plainville,	•	2 10
Groveland,	 38 84	Princeton,	•	6 25
Hadley,	 65 00	Quincy,	•	29 60
Hamilton,	 80 66	Reading,		100 00
Hardwick,	 6 60	Rochester,	. •	32 21
Harvard, .	 54 37	Rockland,		27 14
Harwich, .	 110 10	Rockport,	•	9 89
Haverhill,	 117 18	Rowley,	•	69 10
Hingham,	 22 69	Russell,	•	24 00
Holbrook,	 12 00	Salisbury,	•	83 63
Holliston,	 22 92	Sandwich,		12 00
Hudson, .	 37 89	Scituate,		84 50
Huntington,	 35 15	Shirley,		13 45
Ipswich, .	 37 05	Shrewsbury,	•	79 80
Kingston,	 $23 \ 52$	Somerset,		207 15
Lakeville,	 12 48	South Hadley,		73 60
Lancaster,	 33 33	Southborough,		55 08
Leicester, .	 29 00	Spencer,		21 05
Leominster,	 45 10	Sterling,		77 75
Lexington,	 88 85	Stockbridge,		97 35
Lincoln, .	 67 95	Stoneham,		91 58
Littleton, .	 64 22	Stoughton,		19 25
Lowell, .	 49 51	Sudbury,		147 90

WORK ON STATE HIGHWAYS, 1915 — Concluded.

		_												_
Sutton, .					\$11 85		Westh	orough	1,				\$3	1 05
					131 00	_		ield,					5	5 00
					40 12			ord,					13	2 55
					84 00		Westr	ninster	,					7 70
					84 65	- 1	Westo	n, .						4 40
Tyngsborough,					156 75	- 1		vood,		•				1 42
Ware, .					44 75		_	nouth,						0 68
Warren, .		٠			62 11			aham,						0 16
		٠			77 63			mstow						2 50
Webster, .		٠			17 33	- 1		ington,			٠	•		5 18
		٠			32 75		Winch	nester,				٠		9 60
Wenham, .		٠			100 61		Wobu	rn, .				•		1 91
West Boylston,		٠			66 56			ester,			٠	•		3 33
West Bridgewat West Brookfield					19 80 37 59		xarm	outh,		•		•	13	6 00
West Newbury,		•			105 16								en 22	1 00
West Springfield					35 00								\$9,23	1 04
west opringheto	9	•			30 00									
					M	OT.	HS.							
				- (General	St	atemer	nt.						
Dalamas an har	- J 7	T-	20									e c	0 07	1 60
Balance on har	na 1	VO	v. at	, 18	114,	•	•		•				88,874	
Less reimburse	emei	at	paid	ior	1914,	٠	•		•			3	9,669	90
											-			
Balance fo	or 19	915	owo:	rk,								\$4	19,204	1 73
Receipts: -														
Andover,									S	3205	03			
Ayer,									1	,240	94			
Barnstable, .				•	•	•	•	•		899				
			•	•	•	•	•	• .						
Boylston, .		•	۰		•	٠	•	•		672				
Bridgewater, .										22	75			
Cohasset, .	,									393	22			
Danvers, .										516	08			
Gloucester, .										27	30			
Hingham, .						•	•	•		285	-			
		•	•		•	•	•	٠						
Holden,		•			•	• '		•	1	,255				
Hopkinton, .		4								900				
Hudson,										1	27			
Marlborough,										406	41			
Medford, .														
										nall	40			
Natick,		•	•		٠	•	•	•		640	40 62			

\$7,513 22 \$49,204 73

Amounts carried forward, .

Amount	s bro	ught	forw	ard,					\$7,513	22	\$49,204	73
Receipts -	– Cor	<i>n</i> .										
North Ando					*			٠.	135	34		
Norton, .									86	00		
Princeton,									1,302	34		
Quincy, .			. '						. 6			
Raynham, Revere, .				•				•	315			
Revere, .									57			
Rowley, .						• 1	•		322			
Sherborn,						٠	•	•	62			
Templeton,	•		٠	•	•	٠	*	**	1,460			
Topsfield,		٠		٠		٠		•	2,095			
Wakefield, Weymouth,	•	٠	•	٠,		٠		•	827			
									858			
Check return Fall River,									92			
Medford	٠		•	•	•	•	•	•	269			
Medford, Natick, .				•	•	•			16			
Natick, . Wakefield,								•	456			
New York,	New	Har	ven 8					ad.	200			
rebate for									55	00		
Junk sold,									5	18		
Junk sold, Motor cycles	sold	l,							168			
Refund from	C. J	ī. Ja	eger	Com	pany	,			33	00		
Use of outfit	on t	hini	ning	work	, .				193	80		
State Forest	Com	mis	sion,							66		
State Forest	er's e	expe	nses,						234	22		
Purchase and	d pla	ntin	g of	fores	t land	ls,			40	05		
Dover gypsy									428			
Sagamore Be									50			
Special Nort									5,657			
Relief fund f									1,100			
Appropriation	n for	19.	15,	•	•	•	•	٠	100,000			
Appropriation	n ioi	19.	10,	٠	*	٠	•	•	75,000	00	100.040	00
								_			198,849	89
											\$248,054	62
Office exp	enses	s: —										
Salaries, .		٠.							\$3,484	30		
Rent, .									2,459	96		
Stationery a	nd po	osta	ge,						1,103			
		:	•					•	851			
	;							•		50		
Thinning wo	rk su	ıppl	ies,	•	٠		•	•	343	53		
Amount	s carr	ried ,	forwa	ird,					\$8,340	62	\$248,054	62

	. Amounts	brou	ght	forwa	rd,					\$8,340	62	\$248,054 6	2
C	office expe	nses		Con.									
	plies,									597	77		
-	ps, photog									317	13		
	dries (tele									956	08		
F	ield exper	ses:	_										
	vn pay ro									17,219	78		
	roll,									21,191			
	vel, .									9,499			
	plies,									77,566			
	nt of store									312			
	re equipm									102			
	dries (tea												
	cial work,												
	mburseme												
1001	mourseme	,110,	•		•	•	•	·	_	10,100		159,110 1	4
											-		-

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

The following table shows the reimbursement, amount of supplies furnished, and net amount received from this office by cities and towns for 1914, the required expenditure before receiving reimbursement from the State, the total net expenditure, the amount received for work on private property returned to this office, the amount paid in reimbursement, gross amount of supplies, and total net amount received from this office by cities and towns for 1915, and also the required expenditure for 1916:—

			1914.				1915.	15.			1916.
Cities and Towns.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi-	Total Net Expenditure.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi-
Abington,	က	1	1	1	\$1,459 85	1	1	1	1	1	\$1,505 35
Acton,	က	\$803 89	\$695 97	\$1,499 86	970 01	\$1,150 60	$\left\{ \begin{array}{c} {}^{1}\$291\ 80 \\ {}^{1}39\ 40 \end{array} \right.$	\$179 59	\$574 77	\$754 36	1,005 76
Acushnet,	က	1	1	1	461 61	ı	ı	1	ı	1	487 08
Amesbury,	63	1	1	1	2,681 87	1	1	1	ı	1	2,712 77
Andover,	63	ı	* 864 17	659 14	3,437 11	2,916 08	1,104 46	1	1 755 03	187 20	3,577 76
Arlington,	-	1	1	1	2,000 00	1	1	ı	1	ı	2,000 00
Ashburnham,	, m	476 16	114 38	590 54	510 84	828 84	333 80	348 00	341 88	88 689	466 35
Ashby,	က	483 10	46 05	529 15	257 75	465 52	12 08	207 77	264 74	472 51	316 01
Ashland,	က	1	100 55	100 55	583 64	803 48	58 30	1	138 45	138 45	574 00
Athol,	63	ı	1	1	2,603 15	1	•	1	1	ı	2,677 37
Attleboro,	-	1	1	1	2,000,00	ı		1	1	Ļ	2,000 00
Auburn,	က	82	131 02	131 80	692 00	468 76	283 43	٠, ١	* 47 30	ı	714 63
Avon,	က	261 06	29 06	351 73	446 40	563 77	82 63	117 37	81 89	199 26	450 61
Ayer,	က	116 68	292 55	409 23	928 05	4 851 87	291 75	1	285 60	209 42	975 67
Barnstable,	63	1	* 481 14	1	3,503 85	3,626 51	1,112 19	1	1 2,862 88	2,388 43	3,788 26
Вагге,	e 2	'	'	1	1,089 64	,	1	1	1	1	1,132 90

795, 51	400 34	410 06	4,563 81	228 51	268 13	2,000 00	2,203 17	.986 20	313 13	2,000 00	2,963 65	122 22	541 48	228 33	3,794 33	353 60	1,695 89
1,485 90	1	1	1	68 79	558 99	1	702 54	1	11 818	3,000 00	1	1,445 20	985 36	611 83	1	1	53 71
785 90	13 85	1		16 52	358 99	1	1 784 13	ı	590 63	1	1	595 20	419 29	108 69	1	1	53 71
00 002 {	1	ı	1	52 27	200 00	ı	-	1	328 08	3,000 00	1	850 00	20 999	503 14	ı	1	1
1 242 50 554 33	1	1	1	62 68	423 28	ı	1 297 00 346 95	1	1169 48	18,026 53	1	1187 30	353 50	273 09	ı	1	507 58
1,487 68	1	1	1	277 70	555 72	1	2,130 38	1	531 84	23,940 41	f	1,076 23	1,209 14	4 721 10	1	1	1,844 84
743 59	392 93	401 72	3,530 53	225 43	259 20	2,000 00	2,211 97	981 31	303 76	2,000 00	3,132 73	115 27	643 07	217 96	3,568 30	345 60	1,844 84
2,993 00	1	1	1	76 55	1,540 29	1	1,152 80	1	1,695 50	11,752 43	ı	1,775 81	1,692 14	519 33	ı	1	457 78
1,551 20	1	1	1	21 30	1,720 60	1	814 96	,	\$ 2,060 31	'		652 18	490 58	62 31	66 2 *	1	4 480 53
1,441 80	1	•	1	55 25	419 69	1	337 84	1	235 19	11,752 43	1	1,123 63	1,201 56	457 02	1	1	1
							-										
69	60	က	64	က	60	-	ന	က	က	-	c 3	ಣ	က	က	~	က	က
-	· .	•		•	•	•											
													٠.				
Bedford, .	Belchertown,	Bellingham,	Belmont, .	Berkley, .	Berlin, .	Beverly, .	Billerica, .	Blackstone, .	Bolton, .	Boston, .	Bourne, .	Boxborough,	Boxford, .	Boylston, .	Braintree, .	Brewster, .	Bridgewater,

Arsenate of lead sold.

Town paid part of the cost of supplies.

• Town paid full cost of supplies.

'Received sprayer from State, town paying one-half the cost, \$600.

· Work financed by State.

																	- 6
1916.	Required Expendi- ture.	\$263 08	2,000 00	615 24	2,000 00	389 37	5,000 00	2,735 52	.264 21	847 94	572 31	1,805 84	2,000 00	3,788 36	3,950 36	3,810 94	187 55
	Total Amount received from State.	1	1	1	ı	\$1,101 64	1	1,085 83	2,286 04	2,789 02	8	1,120 06	1	1	•	407 08	1
	Tools supplied.	1	1	1	ı	\$477 79	1	1,468 66	430 94	\$ 2,630 03	1	733 19	1	1	1	528 23	1
5.	Re- imburse- ment.	1	1	ı	ı	\$623 85	ı	1	1,855 10	} 758 99	1	386 87	1	1	1	-	ı
1915.	Private Work.	ı	1	1	1	{ 1,\$27 00 189 00	1	2,296 66	403 13	\[\begin{array}{c} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	ı	69 999	i	1	ı	1164 49 617 29	1
	Total Net Expendi- ture.	ı	1	1	ı	\$1,022 90	1	2,971 74	2,052 06	2,197 46	à	2,175 23	1	1	ı	3,665 36	ı
	Required Expendi- ture.	1	\$5,000 00	562 80	2,000 00	399 05	2,000 00	2,715 96	196 96	838 47	576 27	1,788 36	2,000 00	3,705 84	4,078 02	3,684 74	180 76
	Total Amount received from State.	ı	ı	1	1	\$1,999 06	ı	2,478 42	3,015 42	1,678 11	å	1,492 81	1	ı	1,597 45	1,007 09	ı
1914.	Tools supplied.	1	1	ı	1	\$503 01	1	2,997 60	625 50	667 93	ı	1,185 21	1	1	4 1,990 67	785 41	1
	Re- imburse- ment.	ı	1	ı	1	\$1,496 05	1	440 34	2,389 92	1,010 18	1	307 60	1	. 1	•	378 76	1
	Class.	က	1	က	-	က		7	က	က	က	က	-	61	61	67	89
		•	٠	•	•	•	٠	•	•	•	•	•	•	•	٠	•	-
	n n			٠	٠		•	•	÷					•	•		
	Town		. •														
	Cities and Towns.			٠	. • •	٠	٠			. •							
	TES.	•	٠			, ta	6				. •	d,				•	٠
	Cir	Brimfield,	Brockton,	Brookfield,	Brookline,	Burlington,	Cambridge,	Canton,	Carlisle,	Carver,	Charlton,	Chelmsford,	Chelsea,	Clinton,	Cohasset,	Concord,	Dana, .

3,441 66	2,301 33	2,000 00	1,060 71	602 44	693 15	534 02	3,309 97	1,035 82	1,000 51	170 28	1,562 02	1,160 47	2,914 34	571 79	530 31	2,000 00	1,800 64	2,000 00
491 95	1	1	1	ı	1	1	1	1,234 64	1	842 34	652 27	1	1	1	460 94	1	1	1
* 752 16	•	1	1	1	1	.1	1	734 64	1	192 53	252 27	1	•	6 1 45	40 17	1	1	▶ 92 30
1	1	1	1	1	1	١	1	200 000	1	649 81	400 00	1	1	1	420 77	1	ı	1
1,083 90	1	1	1	1	1	1	1	1 100 00 845 53	1	305 47	327 00	1	ı	1	340 00	'	1	1
2,961 78	1	1	1	1	1	1	1	1,610 66	ı	813 79	1,878 25	714 63	1	1	€ 927 96	1	ı	1
3,099 00	2,119 47	2,000 00	1,039 83	548 99	598 63	523 43	3,354 20	1,012 66	848 20	163 98	1,456 14	1,062 14	2,847 19	552 24	507 19	2,000 00	1,400 44	2,000 00
1,214 38	1	1	3 76	1	1	1	1	1,336 97	1	1,774 07	401 39	1,330 39	1	1	412 62	1	1	ı
78 7967 97	1	1	3 76	1	1	1	1	849 75	1	1,188 65	202 35	1,930 39	1	ı	141 22	1	,	ı
•	1	1	1	1	1	1	1	487 22	•	910 42	199 04	1	1	-	271 40	1	1	1
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63	က	-	co	63	60	co	63	က	က	60		60	63	63	co	1	က	-
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	th,				•	•	•					gewat		n,				
Danvers,	Dartmouth,	Dedham,	Deerfield,	Dennis,	Dighton,	Douglas,	Dover,	Dracut,	Dudley,	Dunstable, .	Duxbury,	East Bridgewater,	Easton,	Edgartown,	Essex, .	Everett,	Fairbaven,	Fall River,

• Work financed by State.

· Town paid full cost of supplies.

Received sprayer from State, town paying one-half the cost, \$600.

1 Arsenate of lead sold.

* Town paid part of the cost of supplies.

			1914.			The same of the sa	1916.	5.			1916.
CITIES AND TOWNS.	Сідзв.	Ro- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi-
Falmouth,	-	1	1	1	\$5,000 00	1	1	1	1	1	\$5,000 00
Fitchburg,	-	ŀ	1	1	6,000 00	1	1	1	1	1	2,000 00
Foxborough,	es	ı	1	1	1,093 67	1	1	1	1	1	1,126 45
Framingham,	. 1	ı	ı	1	2,000 00	1	ı	ı	1	1	2,000 00
Franklin,	eo	ı	1	ı	1,918 97	1 \$157 14	1	1	1	1	2,026 09
Freetown,		ı	1	1	353 78	1	1	1	1	ı	458 11
Gardner,	63	1	1	1	4,538 55	1	1	\$	1	1	4,617 46
Georgetown,	eo -	\$406 49	s \$1,909 44	\$1,715 93	528 67	1,083 84	{ *\$37 20 687 13	\$555 17	\$478 16	\$1,033 33	550 91
Gloucester,	-	ŧ	1 526 18	263 09	2,000 00	4,893 21	1,890 51	1	4 558 84	226 03	2,000 00
Grafton, '	es	ı	1	1	1,297 49	70 777	300 00	1	\$ 1 08	1	1,530 30
Great Barrington,		1	1	1	2,770 19	1	1	1	1	1	4,156 91
Greenfield,		ı	1	ı	2,000 00	1	t	1	1	1	6,000 00
Groton, ,	69	300 00	754 94	1,054 94	1,768 95	1,943 01	118 00	1	503 71	503 71	1,838 09
Groveland,		543 14	163 23	706 37	506 16	857 34	337 54	351 18	102 97	544 15	554 52
Halifax, ,	es	001 16	22 76	683 92	269 24	684 44	233 75	400 00	6 45	406 45	277 62
Hamilton,	63	-	774 01	774 01	2,466 01	2,321 85	1,016 99	1	• 519 88	300. 58	2,676 86

101	0.1			•	. 0			-							1.0.		•	
915 19	618 20	816 90	727 06	5,000 00	3,404 86	713 13	764 10	858 93	3,567 90	794 16	317 51	1,712 32	3,688 76	2,287 70	682 48	513 82	2,815 60	2,000 00
182 79	552 84	1,427 58	ı	1	ı	ı	1,300 93	1	1	56 34	1	526 35	1	706 90	703 48	1	1	ı
432 79	148 87	1,015 11	1	1	1	1	175 08	1	ı	4 65 90	1	526 35	ı	4 764 81	262 64	e 79 00	ł	1
350 00	403 97	} 412 47	1	1	1	1	1,125 85	1	1	1	1	ŧ	1	1	} 440 84	1	1	1
167 40	341 58	8 372 12 394 77	1	1	ı	1	308 50	1	1	1	1	787 30	1	1,343 50	{ *13 00 305 34	1	1	1
1,322 53	997 37	1,135 91	1	1	ı	1	1 1,868 96	1	1	1 736 10	ı	1,692 70	1	2,152 87	1,113 83	ı	4	1
852 74	593 40	723 44	669 28	2,000 00	3,314 48	680 29	743 11	813 98	2,682 36	755 66	302 89	1,692 78	3,548 58	2,210 78	625 88	513 60	2,765 93	2,000 00
2,640 48	663 99	1,813 47	1	-	1,007 55	1	2,308 40	99	1	133 42	1	1,376 21	1	1,206 63	1,427 47	1	1	ı
1,176 11	276 76	1 2,405 56	1	1	1 1,258 18	1	299 57	89	ı	68 09	1	11,976 21	1	957 38	294 73	1	1	1
1,464 37	387 23	7 91	ı	1	1	ı	2,008 92	1	1	72 53	1	ı	1	249 25	1,132 74	ı	1	1
60	60	eo	က	1	63	က	ಣ	က	2	က	က	က	63	က	ಣ	က	63	7
-	•		•				•		•			•	•			•	•	
	•											٠						
Hanover, .	Hanson, .	Harvard, .	Harwich, .	Haverhill, .	Hingham, .	Holbrook, .	Holden, .	Holliston, .	Hopedale, .	Hopkinton,	Hubbardston,	Hudson, .	Hull,	Ipswich, .	Kingston, .	Lakeville, .	Lancaster, .	Lawrence, .

Town paid part of the cost of supplies.
 Town paid full cost of supplies.

Work financed by State.
Received sprayer from State, town paying one-half the cost, \$600.
Arsenate of lead sold.

			1914.				1915.	ů,		1	1916.
CITIES AND TOWNS.	Славн.	Ro- imburso- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Loicostor,		1	1	1	\$1,021 31	1	1	1	•	1	\$1,005 64
Lenox,		1	1	1	3,645 75	1	1	1	1	ı	3,390 83
Leominster,		1	1	1	2,000 00	ı	1	1	-	1	2,000 00
Loxington,	61	\$1,098 57	\$931 09	\$1,843 44	3,605 05	\$6,005 31	1,220 43	00 008\$ {	\$1,310 21	\$1,847 17	4,011 27
Leyden,	en .	1	1	1	91 19	1	1	1	1	1	19 86
Lincoln,	es	162 48	1,700 38	1,862 86	1,604 02	2,779 80	1 292 50 927 85	' ~	1,446 44	1,446 44	2,069 40
Littleton,	es .	343 47	607 82	1,041 29	493 03	686 15	1 243 60 106 75	} 193 12	465 27	658 39	506 47
Lowell,	-	ı	386 58	193 29	2,000 00	4,956 43	3,254 28	ı	s 387 41	1	2,000 00
Lunenburg,	es .	662 46	676 75	1,339 21	602 52	1,081 44	1143 60 2,037 59	478 88	606 72	1,085 60	646 06
Lynn,		ı	1	ı	6,000 00	1	1	1	1	1	2,000 00
Lynnfield,		1,849 81	567 44	2,417 25	525 74	1,574 21	597 90	1,048 47	529 13	1,577 60	238 08
Malden,		•	1,	ī	2,000 00	1	1	1	1	1	2,000 00
Manchester,		1	1	1	2,000 00	1	1	1	1	ı	2,000 00
Mansfield,		1	ı	t	1,342 09	1	1	ı	1	1	1,809 21
Marblehead,	61	1	•	1	4,444 38	1	1	ı	1	ı	4,584 16

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2,252 33	4,522 88	1,120 58	143 50	938 57	1,670 16	971 59	2,000 00	733 08	2,000 00	296 92	558 59	3,893 50	1,984 82	369 60	4,188 83	1,359 65
1	1,481 04	451 83	1,361 43	1	1	ŀ	1	1	1	1	745 61	611 86	2,074 06	977 22	1	ı
,	803 13	152 53	437 85	1	1	1	* 269 70	1	1	1	211 99	s 929 23	1,075 64	227 22	1	1 08
,	838 54	399 30	923 58	ı	ı	•	1	ł	1	ı	533 62	-	998 42	250 00	1	1
1	1,60,00 2,398,44	1,193 60	297 08	1	1	1	1	1	1	1	\[\begin{array}{c} \be	1,755 37	1,410 00	1 29 50 103 50	1	. 1
1	8,160 90	1,344 81	1,029 98	1	ı	1	1	'	1	1	1,071 09	3,605 96	3,000 65	1,175 03	ı	ı
2,350 14	4,402 46	1,045 51	106 40	758 23	1,652 82	1,022 12	2,000 00	716 36	2,000 00	287 03	537 47	3,754 86	1,986 31	371 73	4,061 36	1,285 32
ı	1,629 03	1,671 68	1,031 03	1	1	1	i	1	1	1	1,168 55	973 70	1,642 02	1,067 19	ı	ı
•	3, 4 2,486 28	871 93	253 03	1	ı	1	1 640 40	7	1	1	216 59	4 1,135 05	836 47	226 83	ı	ı
-	ı	799 75	778 00	1	1	1	ı	4	i	1	921 96	65 66	805 55	840 36	1	-
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co	63	က	က	63	က	3	1	က	-	3	က	61	က	က	63	က
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Marion, .	Marlborough,	Marshfield, .	Mashpee, .	Mattapoisett,	Maynard, .	Medfield, .	Medford, .	Medway, .	Melrose, .	Mendon, .	Merrimac, .	Methuen, .	Middleborough,	Middleton, .	Milford, .	Millbury, .

Work financed by State.

From paid part of the cost of supplies.

Received sprayer from State, town paying one-half the cost, \$600.

¹ Arsenate of lead sold.
² Town paid full cost of supplies.

			1914.				1915.	15.			1916.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required. Expenditure.
Millis,	က	1	ı	1	\$558 17	1	1	1	1	1	\$589 23
Milton,	1	1	1 \$18 50	1	2,000 00	ı	1	1	1	1	2,000 00
Montague,	3-2	1	1	1	2,059 57	1	ı	1	ı	1	2,401 59
Nahant,	67	ŧ	ł	1	3,474 48	ı	1	-1	1	1	3,375 80
Nantucket,	က	1	.40	\$0 40	1,836 92	1	ı	1	1	ı	1,869 67
Natick,	61	ı	1 92 15	1	3,647 16	\$5,136 14	\$234 35	1	2 \$36 29	1	3,717 30
Needham,	7	ı	ı	t	3,365 53	1	ı	ı	ı	1	3,604 35
New Bedford,	1	1	ı	1	2,000 00	1	1	1	ı	1	2,000 00
New Braintree,	က	ı	t	ı	164 95	1	1	1	1	1	168 90
New Salem,	က	1	ı	1	162 70	1	1	1	1	1	159 18
Newbury,	ေ	\$1,049 05	531 58	1,580 63	632 69	1,386 54	{ * 242 59 719 07	\$750 85	665 87	\$1,416 72	19 299
Newburyport,	1	ı.	1	ı	2,000 00	1	1	1	1	1	2,000 00
Newton,	1	1,598 54	4,789 55	3,993 31	2,000 00	12,837 60	15,287 83	1	4,372 97	2,186 48	2,000 00
Norfolk,	က	346 90	111 96	458 86	465 54	861 59	199 52	300 00	89 64	389 64	468 54
North Andover,	3-2	1	4 775 57	640 23	2,301 33	2,294 72	1,020 54	-	1 677 07	670 46	2,416 82
North Attleborough,	67	1	1	1	3,876 10	1	1	1	1	1	3,825 19

818 23	397 32	795 29	2,296 00	670 72	553 87	2,000 00	22 008	154 44	1,612 17	1,932 24	843 57	2,147 86	168 60	2,000 00	498 69	942 18	416 26	122 27	423 38
1	2,020 06	1,062 86	1	1	957 69	ı	1	1	1	40	1	,	1	1	1,282 95	1,124 00	1	ı	43 34
1	820 06	429 01	1 1 08	1	69 299	1	ı	1	1 80	40	1 08	1	1	1	549 98	572 47	1	1	43 34
1	1,200 00	632 95	1	ı	300 00	1	1	1	1	1	1	1	1	1	732 97	551 62	1	1	1
1	557 76	301 20	1	1	714 27	ı	1	1	ı	1	ı	1	ı	1	618 42	369 82	1	1	134 28
ı	1,624 84	1,403 66	ı	\$ 107 75	812 05	ı	1	ı	ı	ı	1	1	1	1	1,307 96	1,495 04	1	1	496 12
800 17	393 09	170 71	2,232 67	09 099	475 65	4,449 52	279 00	147 11	1,605 70	1,534 24	836 65	2,103 39	163 18	2,000 00	466 61	943 42	460 97	124 70	417 16
1	2,603 59	1,353 08	1	,	1,636 43	ı	1	ı	1	1	1	1	1	1	1,972 54	1,509 32	1	1	350 97
_																			
	1,017 92	448 73	1	1	1,231 53	1	1	1	1	1	1	1	1	1	6 1,920 17	571 79	1	1	150 97
1	1,585 67 1,017 92	904 35 448 73	1	1	404 90 1,231 53	1	1	1	1	1	1			1	652 37 6 1,920 17	937 53 571 79	1	1	200 00 150 97
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· Received sprayer from State, town paying one-half the cost, \$600.

· Work financed by State.

Town paid part of the cost of supplies. 2 Town paid full cost of supplies. * Arsenate of lead sold.

			1914.				1915.	.55.			1916.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi-
Plymouth,	1	ı	ı	ı	\$5,000 00	t	ı	1	1	1	\$5,000 00
Plympton,	က	\$1,789 59	\$284 34	\$2,073 93	182 82	\$1,280 13	1 \$21 65 108 37	\$1,097 31	\$225 49	\$1,322 80	186 21
Princeton,	က	6,915 36	682 96	7,598 32	594 05	* 2,516 68	247 80	1,822 63	387 33	2,209 96	20 999
Provincetown,	က	1	1	1	969 35	1	1	ı	1	ı	88 086
Quincy,	-	1	1,133 92	1	2,000 00	1	1	1	1	ſ	2,000 00
Randolph,	က	ı	1	1	1,153 50	ı	1	1	ı	ı	1,266 86
Raynham,	က	122 63	47 45	170 08	313 30	332 37	126 09	t	160 62	160 62	396 38
Reading,	2	32 28	1,850 11	1,512 37	3,007 58	2,794 41	2,171 80	1	1,418 15	509 81	3,199 81
Rehoboth,	က	•	1	1	328 34	8	ı	1	1	ı	428 10
Revere,	-	1	1	1	2,000 00	4	1	1	ı	ı	2,000 00
Rochester,	က	1	1	ı	415 98	ı	ŧ	t	1	1	420 63
Rockland,	က	ı	•	ı	2,171 19	2,859 90	1	1	4 1,731 13	1,131 13	2,191 96
Rockport,	က	,	1		1,609 42	1	1	ı	1	1	1,634 04
Rowley,	က	1	4 608 57	285 66	869 73	862 32	473 03	1	s 525 37	517 96	819 66
Royalston,	က	ı	1	1	299 39	1	1	t	1	1	299 06
Rutland,	က		1	1	366 93	1	1	1	1	ı	377 27
Salem,	1	,	1	1	2,000 00	ı	1	1	1	,	2,000 00

82 289	610 14	2,855 15	2,375 58	750 31	1,598 84	959 15	555 13	1,191 35	735 12	5,000 00	945 91	1,451 60	2,000 00	548 03	1,807 00	2,438 34	1,740 18	590 61
1,015.42	631 94	520 17	1,995 42	1	1	472 25	275 09	1	1	1	775 33	1	1	364 01	1	1,081 32	170 64	1,093 73
488 32	381 94	• 592 89	895 42	ı	,	372 25	\$ 298 26	e 98 30	1	1	375 33	1	1	326 75	1	881 32	• 231 57	677 21
527 10	250 00	219 44	1,100 00	1	1	100 00	1	1	1	1	400 00	1	1	37 26	ı	200 00	1	416 52
1 63 05	76 50	1,832 25	979 52	1	1	1,072 31	176 05	257 01	1	1	99 689	1	1	161 90	1	1,536 69	250 83	{ 1437 81 295 95
1,117 26	871 64	3,045 30	3,497 92	1	1	1,099 75	28 009	907 12	1	1	1,374 68	1	1	560 12	1	2,562 14	1,605 37	879 20
590 16	220 20	2,777 34	2,279 01	637 08	1,484 78	957 37	524 04	1,090 37	615 49	2,000 00	926 47	1,457 87	2,000 00	508 38	1,991 67	2,362 14	1,666 30	462 68
1,481 90	376 55	1,673 03	3,812 71	1	ı	264 64	565 21	38 61	1	1	587 40	1	š	1,272 83	1	746 68	976 48	1,848 60
1,874 54	156 93	• 1,027 34	1,063 61	1	1	4 326 74	405 15	38 61	1	1	238 46	1	1	426 59	1	622 69	866 06	\$ 2,248 60
207 36	219 62	851 16	2,749 10	1	1	1	160 06	1	ı	1	348 94	1	1	846 24	1	66 69	110 42	200 00
67	en	67	က	3	က	co	ಣ	က	က	-	က	60	1	က	co	3-2	က	က
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					•									•	•		•	
Salisbury, .	Sandwich, .	Saugus, .	Scituate, .	Seekonk, .	Sharon, .	Sherborn, .	Shirley, .	Shrewsbury,	Somerset, .	Somerville, .	Southborough,	Spencer, .	Springfield, .	Stérling, .	Stockbridge,	Stoneham, .	Stoughton, .	Stow, .

· Received sprayer from State, town paying one-half the cost, \$600.

Form paid full cost of supplies.

* Town paid part of the cost of supplies.

Arsenate of lead sold.

			1914.				191	1915.		П	1916.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Sturbridge,	က	ı	1	1	\$376 69	ı	ı	1	1	1	\$382 04
Sudbury,	က	\$956 77	\$746 22	\$1,702 99	599 43	\$1,130 01	{ 1 \$213 13 476 99	\$530 58	\$791 36	\$1,321 94	646 39
Sutton,	ಣ	ı	1	1	583 98	1	ı	1	ı	•	619 97
Swampscott,	1	1	t	ı	6,000 00	1	ı	1	ı	1	2,000 00
Swangea,	ಣ	1	1	1	499 77	1	ı	1	I	ł	780 74
Taunton,	1	1	1	ı	2,000 00	ı	1	ı	1	1	2,000 00
Templeton,	60	1,383 13	243 73	1,626 86	789 90	1854 31	645 66	64 41	122 93	187 34	810 03
Tewksbury,	63	1,151 70	1,018 45	2,170 15	676 85	1,573 18	299 87	896 33	709 32	1,605 65	744 71
Tisbury,	es	1	1	1	807 58	1	1	1	1	1	863 41
Topsfield,	က	ı	294 91	12 202 1	1,628 20	1,685 80	665 44	22 60	230 06	287 66	1,717 93
Townsend,	က	601 86	552 84	1,154 70	66 299	1,145 81	425 65	400 00	350 01	750 01	578 13
Truro,	63	1	1	1	169 23	1	1	1	147 54	147 54	207 68
Tyngsborough,	က	1,610 33	1,021 85	2,632 18	283 11	1,870 03	136 00 512 28	1,450 00	757 90	2,207 90	301 37
Upton,	က	1	1	1	507 46	1	1	1	41 08	1	523 00
Uxbridge,	60	. 1	1	1	1,608 55	I,	\$	ı	4 1 08	t	1,744 11
Wakefield.	67	1	4 827 18	1	4,766 51	3,170 50	ı	1	4 456 63	1	4,981 12

101	.0.]												•		- 1	•	• • •	
3,014 00	2,000 00	2,672 06	1,066 75	182 11	2,000 00	1,207 28	3,606 32	2,000 00	342 76	219 73	1,464 86	411 84	750 03	446 39	1,337 09	970 43	401 17	3,484 34
1	1,190 32	1	1	I	1	1,010 23	1	1	ı	1	614 42	1,059 60	1,002 45	939 91	149 36	1,747 09	1,302 11	931 43
1	•2,614 62	ı	1	1	1	1,010 23	ı	1	ı	1	\$ 705 21	96 899 94	402 45	8, 5 1,578 35	* 189 17	914 07	105 41	1,862 87
ı	ı	ı	1	1	1	1.	ı	ě	i	ı	1	390 64	00 009	1	ı	833 02	1,196 70	t
1	2,971 40	1	1	1	ı	1 437 12 506 24	1	1	ı	1	444 39	239 74	487 66	355 81	399 76	488 84	140 91	2,315 00
ı	7,380 64	1	1	1	1	1,225 54	ı	ŧ	1	1	1,230 51	18 086 s	1,282 31	992 79	1,293 64	1,735 66	1,587 59	5,698 32
2,864 54	2,000 00	1,918 00	1,024 81	187 68	2,000 00	1,205 84	3,376 96	2,000 00	336 92	205 15	1,321 30	397 72	656 62	430 32	1,333 45	902 64	390 89	3,516 77
1	1,408 77	ı	ı	1	1	1,188 14	1	1	1	ı	846 96	11	1,208 81	764 89	516 14	1,528 64	2,101 67	1,231 70
-	1,454 30	1	ı	ı	•	922 70	ı	1	1	ı	17 173	77	366 55	215 42	138 61	912 82	130 62	1,539 63
1	681 62	ı	ı	1	ı	265 44	1	1	1	1	275 25	1	842 26	549 47	377 53	615 82	1,971 05	1
63	1	32	62	က	1	က	7	-	က	60	60	ಣ	ಣ	8	89	69	က	63
•				•	•	•	•		•		•	•	•		•		•	
	٠										٠			٠	٠	٠		
		•		٠	٠		٠	٠	٠	٠	٠	٠	٠	•	٠	٠	•	
													Vest Bridgewater,	Vest Newbury, .				
												Vest Boylston,		~				

· Town paid full cost of supplies.

· Town paid part of the cost of supplies.

¹ Arsenate of lead sold. ¹ Work financed by State.

. Town paid tun cost of supplies.

Received sprayer from State, town paying one-half the cost, \$600.

1916.	Required Expendi- ture.	\$982 63	1,804 62	2,000 00	303 93	2,303 84	485 61	843 89	1,778 80	2,000 00	2,000 00	2,000 00	2,000 00	153 14	642 18	1,023 11
	Total Amount received from State.	ı	1	ı	1	ı	ı	\$1,821 13	610 34	ı	ı	ı	726 93	1	'	1
	Tools supplied.	1	1	ı	ı	ı	1	\$871 13	331 69	ł	1	* 219 29	1,453 86	1	1	1
5.	Re- imburse- ment.	1	1	ı	1	1	ı	\$950 00	278 65	1	1	ı	1	1	1	1
1915.	Private Work.	ı	1	1	1	1	ı	\$776 72	641 69	•	1	623 55	6,845 97		ı	1
	Total Net Expendi-	1	ı	ı	1	ı	1	\$1,755 28	2,016 10	1	1	4,203 20	10,344 80	1	1	1
	Required Expendi- ture.	\$813 32	1,788 42	4,808 27	291 84	2,256 00	467 74	792 29	1,737 45	2,000 00	2,000 00	4,933 61	2,000 00	149 63	620 34	1,048 39
	Total Amount received from State.	1	ı	\$1,014 38	5 26	1	ı	2,109 24	1,228 30	1	1	3,470 62	1,512 03	1	•	1
1914.	Tools supplied.	Į.	1	1 \$1,873 06	5 26	1	1	812 67	325 73	1	1	867 21	1, \$ 3,024 06	1	1	1
	Re- imburse- ment.	î	ı	-1	1	1	1	\$1,296 57	902 57	ı	1	2,776 85	1	1	1	1
	Class.	es	က	2-1	က	က်	ಣ	က	က	-	-	2-1	1	က	က	က
				•											٠	•
	WNB.		٠	٠		٠	٠	•		•	•				•	•
	CITIES AND TOWNS.															
	ES AN						rg,	4	n,					n,		
	Стиг	Westport,	Westwood,	Weymouth, .	Whately,	Whitman,	Williamsburg,	Wilmington,	Winchendon,	Winchester, .	Winthrop,	Woburn,	Worcester,	Worthington,	Wrentham,	Yarmouth,

² Town paid full cost of supplies.

* Received sprayer from State, town paying one-half the cost, \$600.

¹ Town paid part of the cost of supplies.



A State highway planted with spruce trees, Groton.



REPORT OF THE STATE FORESTER ON THE RESOLVE PROVIDING FOR AN INVESTIGATION RELATIVE TO THE TAKING OF MOUNT HOLYOKE AS A STATE RESERVATION.

To the General Court.

In the matter of the investigation relative to a State reservation bein made of Mount Holyoke, as directed by the General Court in the following resolve,

"That the state forester shall investigate and report to the next general court, not later than the third Wednesday of January, as to the advisability, practicability and cost of taking and maintaining Mount Holyoke as a state reservation, with such other information relating thereto as he may deem expedient," I respectfully state that this investigation has been made and is herewith reported upon. The State Forester was more or less familiar with the property in question, and besides visiting the grounds himself, delegated one of his assistants, Mr. Frank L. Haynes, to make a survey of Mount Holyoke in order to present a comprehensive view of the situation.

The basis of this report is therefore the thorough study made by Mr. Haynes during the month of September.

LOCATION.

Mount Holyoke, an elevation of 954 feet, occupies a commanding position on and forms a part of the western end of that portion of the Holyoke Range lying east of the Connecticut River. The dividing line between the townships of South Hadley and Hadley follows approximately the ridge of the range, thereby placing the mountain partly in both townships.

AREA.

The area covered during the investigative work consists of a tract of 256 acres known as the Mount Holyoke Reservation, which is at present owned by the Mount Holyoke Company. This tract includes the summit of the mountain and land on all sides of it within the limits shown upon the plan in the files of the State Forester's office. Upon this area are located the Mount Holyoke Hotel and several smaller buildings used in connection with the reservation.

TOPOGRAPHY AND SOILS.

With the exception of parts of the lower slopes the mountain is of a steep and rugged nature, having a rise in elevation from base to summit of about 900 feet in 3,000, and on the steeper portions a rise of 450 feet in 1,000. For the most part the area lies between 300 and 900 foot levels.

The main material making up the ground structure of the mountain is basalt. This hard stone occurs to a considerable extent in solid ledge formation, and especially on the ridge and upper slopes, where it is found completely exposed or very lightly covered with soil. Through the slow process of disintegration and wash, natural forces have succeeded in covering the lower slopes and pockets with sufficient soil for a good growth of trees to thrive, and on the extreme lower slopes the land is suitable for farming, and is used as such.

It is upon the lower slopes, where the soil is of sufficient depth, that any future tree growth of an intensive nature can be carried on.

GROUND COVER.

The tree growth and smaller plants found upon the area are as follows: —

Basswood. Chestnut. Butternut. Oak (red). Maple. Chestnut oak. Oak (white). Elm. Moosewood. Oak (black). Cherry. Flowering dogwood. Hemlock. Poplar. White pine. Rèd pine. Mountain laurel. Birch (white). Red cedar. Witch hazel. Birch (black). Ironwood. Juniper. Birch (yellow). Beech. Sumach. Willow. Sassafras. Ash. Hickory. Sycamore. Blueberry.

Some of the above listed species occur in small numbers, and are listed mainly to give an idea of the varied flora found upon the reservation.

On the whole, the tree growth found upon the area is not of especial value from a commercial point of view. About one-third of the area is at present stocked with trees of suitable size for lumber, poles and ties.

Chestnut.

Among the trees upon this area the chestnut predominates. This species occurs either in pure stands or scattered among other hardwoods and hemlock, and ranges in size from young sprouts up to trees of 20 inches in diameter. Unfortunately, the chestnut now standing on the reservation is in a dead or dying condition, owing to the prevalence of the chestnut blight, or bark disease. The investigation showed that nearly 97 per cent. of the trees of this species were infected, including trees of large size, and it is safe to assume that within two years nearly every chestnut tree on the reserve will be killed. These dead and dying trees contain in total several thousand feet B. M. of lumber and ties, and should be cut and utilized while they have a commercial value.

Hemlock.

This tree occurs either in nearly pure small stands or scattered among the hardwood growth. Several large specimens are present on the reserve, but the combined stands of hemlock constitute only a small amount.

White Pine.

There is but one small stand of this species upon the area. It covers about 2 acres on one of the lower slopes, and was evidently planted about thirty-five years ago. The stand has made an average growth of about 1 foot per year in height, and is mainly important in that it gives a good indication of what this valuable tree species will do under the conditions that obtain on the Mount Holyoke area where sufficient soil is available.

Oaks.

Many good specimens of red, white and black oaks are found on the reservation, the larger of them reaching a diameter of 16 to 18 inches. The major part of the oak growth consists of medium and small sized trees.

Other Species.

Ash, birch, hickory, poplar and remaining listed species occur on many parts of the reserve, but are mostly of small size and of little value other than for cordwood. On the ridges and upper slopes, where exposed conditions and shallow soil obtain, the growth is of a poor and stunted nature and must continue to remain so. While the larger part of the tree growth upon the area is not of especial value commercially, it is of very material value as a covering for the mountain, thereby enhancing its natural beauty from an æsthetic view-point.

WATERSHED.

The area under consideration is of importance as a watershed only in so far as it forms a part of the Holyoke Range as a whole.

FORESTRY PRACTICE.

The Mount Holyoke lands as a whole do not constitute a good forestry proposition. On the lower slopes, as before stated, soil conditions are such that forestry practice could be carried on to a certain extent. This would mean the clear cutting of the dead chestnut and the usual necessary thinnings in the remaining growth where it would pay to make them, to be followed by planting the area to pine. Inasmuch as this suitable forestry area is small (about 100 acres), the returns through forestry practice necessarily would be small even over a long period of time. On the upper slopes the growth should be left about as it is, except in places where light thinnings could be made to pay for the expense involved.

REMARKS.

Among the many elevations found within the boundaries of Massachusetts the position occupied by Mount Holyoke is in many ways unusual and unique. Rising as it does out of the fertile and highly cultivated valley of the Connecticut River, and to a height sufficient to command views over an extensive radius in nearly all directions, it is possible to observe from the summit of Mount Holyoke combinations of scenery of a nature that can be obtained from but few elevations in this entire country.

From the Mount Holyoke Hotel, located on the summit of the mountain. there may be seen mountains in 4 States, also 40 towns, cities and villages, 32 of which are in Massachusetts and 8 in Connecticut, namely: —

MOUNTAINS.

Monadnock, New Hampshire. Falcott, Avon, Conn. Sugar Loaf, Massachusetts. Tom, Massachusetts. Green, Vermont. Greylock, Massachusetts.

Norwottock, Massachusetts. East and West Rock, New Haven, Conn. Wachusett, Massachusetts. Toby, Massachusetts. Nonotuck, Massachusetts.

Towns.

Northampton. Whately. North Amherst. South Hadley. Longmeadow. Blandford. Thompsonville, Conn. Suffield, Conn. Haydenville. South Deerfield. Amherst. Wilbraham. West Springfield. Ludlow. Windsor, Conn. Somers, Conn. Williamsburg. Greenfield. South Amherst. North Wilbraham.

Agawam. East Windsor, Conn. Goshen. Shelburne. Pelham. Springfield. Southampton. Enfield, Conn. Hadley. Sunderland. Belchertown. Chicopee. Easthampton. Hatfield. North Hadley. Granby. Holyoke. Montgomery. Hartford, Conn. West Hartford, Conn.

Some of the Objects of Interest viewed from the Mountain. State Hospital, Round Hill, Smith College and Clark Institute in Northampton. Williston Seminary, Easthampton.

Amherst College, Massachusetts Agricultural College, and Mount Pleasant, Am-

Mount Holyoke College at South Hadley. Wesleyan Academy at Wilbraham. United States armory at Springfield. Manufacturing city of Holyoke. Ingleside, South Holyoke. Old Hadley Ox Bow Island. Shepherd's Island in the Connecticut River.

The mountain located as it is among so many well-populated towns and cities becomes readily accessible to many thousands of people, the more so owing to the fact that an excellent automobile road runs clear to the summit.

The natural beauties of Mount Holyoke and the very excellent scenic views to be obtained from it have been familiar to thousands of people for many years.

THE MOUNTAIN HOUSE.

The first house was built in 1821 and replaced in 1851. The present hotel is a wooden building about 75 by 165 feet with 15-foot veranda on all four sides, having a main office floor 20 by 155 feet, good dining room, parlor, library and observation room, and can accommodate 60 to 75 people at one time. All of the registers of the hotel since 1822 have been preserved and are open for inspection. Many prominent names appear, among them those of Abraham Lincoln, James K. Polk and Jenny Lind. The hotel has been returning a profit to the company in recent years. Other buildings on the reservation consist of the reservation superintendent's house, stable, power house, workshop and a covered incline railway running up to the Mountain House. The buildings are in a good state of repair.

AUTOMOBILE ROAD.

The macadam automobile road from the base to the summit of Mount Holyoke constitutes what is no doubt as fine a road as can be found running to the summit of any mountain in the Commonwealth.

FORMER OWNERSHIP.

The property was owned for many years by the Dwight family, who maintained there a hotel for the service of the many who visited it because of the great beauty of its situation. The buildings erected by them cost not far from \$100,000 and are in good condition at the present time. Owing to death in the family there was a well-grounded fear that the property might be sold to some one who would cut the timber and otherwise disfigure the mountain. To avoid this the Mount Holyoke Company was formed. Its sole purpose was to preserve the mountain for the benefit of the community at large. In furtherance of this object the Dwight family turned in all of its property to the Mount Holyoke Company in consideration of 250 shares of the par value of \$100 each of the capital stock of the Mount Holyoke Company, or a total of \$25,000. There was paid in by other stockholders \$23,000 in cash for 230 shares of like par value. In addition to this, \$32,000 has been raised by loans. The cash subscriptions and loans were used very largely by the company for improving the approach to the top of the mountain, the buildings, etc. The macadam roads up the mountain cost \$38,000.

STOCKHOLDERS.

The following list contains the names and amount of stock held by the various owners at the present time.

480

	37
LIST OF STOCKHOLDERS.	Number of shares.
Goetting, A. H., 269 Bridge Street, Springfield, Mass.,	. 10
Bridgman, C. J., 187 Elm Street, Northampton, Mass.,	. 1
Bell, Clinton E., 25 Harrison Avenue, Springfield, Mass.,	. 2
Brewer, Frances, 138 Elm Street, Northampton, Mass.,	. 2
Cooley, Clarissa A., 119 Farrington Street, Hartford, Conn.,	. 2
Clarke, Christopher, 40 Hawley Street, Northampton, Mass	. 2
Dwight, Helen M., 31 Mount Morris Park, West, New York City, care	of
R. E. Dwight,	. 12
Dwight, Kirby, 31 Mount Morris Park, West, New York City, care of R	. E.
Dwight,	. 10
Dwight, Katharine W., 31 Mount Morris Park, West, New York City, car	e of
R. E. Dwight,	. 10
Dwight, Marion E., 31 Mount Morris Park, West, New York City, care	e of
R. E. Dwight,	. 10
Dwight, Ellsworth E., 192 Summit Avenue, Summit, N. J., care of R.	E.
Dwight,	. 10
Dwight, Richard E., 96 Broadway, New York City,	. 10
Gillett, Frederick H., House of Representatives, Washington, D. C., .	. 2
Green, Addison L., 1229 Northampton Street, Holyoke, Mass.,	. 1
Hemphill, Ashton E., Holyoke, Mass.,	. 1
Judd, Chas. C., 1495 Northampton Street, Holyoke, Mass.,	. 1
Judd, John K., 48 Fairfield Avenue, Holyoke, Mass.,	. 1
Ketcham, Genevieve, 31 Mount Morris Park, West, New York City, car	e of
R. E. Dwight,	. 16
Ketcham, Everett P., 120 West 122d Street, New York City,	. 16
Lyman, Frank, 82 Wall Street, New York City,	. 10
Look, Estate of Frank N., Florence, Mass.,	. 2
Leggett, J. Dwight, care of R. E. Dwight,	. 20
Leggett, Noel B., care of R. E. Dwight,	. 21
Leggett, Schuyler M., care of R. E. Dwight,	. 21
Metcalf, Joseph, Northampton Street, Holyoke, Mass.,	. 50
Metcalf, Frank H., Holyoke, Mass.,	. 2
Metcalf, Howard F., 163 Walnut Street, Holyoke, Mass.,	. 1
Newton, James H., Northampton Street, Holyoke, Mass.,	. 50
Page, Thomas C., Chicopee Falls, Mass.,	. 2
Page, Irving H., Chicopee Fails, Mass.,	. 10
Skinner, Joseph A., 206 Elm Street, Holyoke, Mass.,	. 50
Shores, H. T., 177 Elm Street, Northampton, Mass.,	. 1
Shores, Mabel D., 177 Elm Street, Northampton, Mass.,	. 1
Steiger, Albert, Ridgewood Terrace, Springfield, Mass.,	. 1
Stern, Lilian D., Westfield, New Jersey, care of R. E. Dwight,	. 16
Schillaire, A. J., 203 Bridge Street, Northampton, Mass.,	. 1
Tilley, Estate of John, 181 Northampton Street, Holyoke, Mass.,	. 1
White, Alfred T., 40 Remsen Street, Brooklyn, N. Y.,	. 5
White, Annie J. L., 40 Remsen Street, Brooklyn, N. Y.,	. 5
Williston, Estate of A. L., 35 Round Hill, Northampton, Mass.,	. 10
Westerfield Florence Upper Montelein N. L. core of P. F. Dwight	
Westerfield, Florence, Upper Montclair, N. J., care of R. E. Dwight,	. 16
Walker, Marion D., 11 Mount Morris Park, West, New York City, car R. E. Dwight,	. 62
To the Divigities	. 02

The following is the last inventory of the company's property and was made in 1913: —

1916.] PU	JBLIC 1	DOCU	MENT	— No.	73.	119
Hotel with new part,						. \$40,000
Furniture,	•					. 1,000
Two dwelling houses.						. 1,800
Farm (21 acres), .						. 1,500
Barns and garage, .			i			. 2,000
Forest land (236 acres	3)	2				. 10,000
New roads,						. 33,000
Four horses,						. 600
			. ,			. 300
John Dwights Avenue						. 5,000
Farm tools and wagon	ns,		٠			. 200
Ice house,						. 100
Apple orchard, .						. 210
Total,						\$95,710
The following is Boston, Mass. (May			the Co	ommissio	ner of Co	rporations,
Real estate, .						\$60,000 00
Machinery, .						1,600 00
Cash and receivables,						2 32
Profit and loss.						17.677 36
	•		•	•	· .	11,011 00
Total, .						\$78,669 68
Balance capital stock						\$48,100 00
Funded indebtedness,						15,000 00
Floating indebtedness	, .					15,569 68
					_	
Total, .				• . •		\$78,669 68
The property was	s taxed as	follows	in 1918	5: —		
Tand Couth Wadless					81 000	
Land, South Hadley,		• •	* 1		\$1,000	
Land, Hadley, .		• •	• 1		4,805	
Madal.						07.007
Total, .			•			\$5,805
Buildings, South Had	low				\$5,500	
Buildings, Hadley,	icy,		•	•	4,700	
Dunungs, Hauley,			•		4,700	10,200
Total, .						\$16,005
,	HOTEL :	RECEIPT	S AND E	XPENSES.		
		Receipts	for 1915.			
Board,						\$5,624 59
Admissions, .						687 30
Expense,						54 08
Soda,						72 75
Postals,						228 50
Candy,						43 87
Pool,					· .	5 15
Livery,						157 30
Cash advanced by J.						170 38
Jan ad anioca by 0.	ii. itowoti,		•	•		110 00

\$7,043 92

Total,

					Expe	nses f	or 191	5.				
Supplies,											\$2,173	86
Livery,											61	50
Expense, 1	paint	ing ar	nd re	pairs,							1,240	66
Soda,											. 42	20
Postals,											131	42
Candy,											42	62
Help.											1,983	00
Advertisin	g,										323	73
Miscellane	eous	(Lyma	an, C	. Clarl	k, Int	erest a	and In	surar	ce),		1,039	57
Balance in	ban	k,	•				• •				5	36
Total	,			•				•	•		\$7,043	92
				Bills	PAY.	ABLE]	DEC.	1, 191	.5.			
Taxes, tov	vn of	Hadl	ey,								\$148	03
W. N. Pot	ter S	ons &	Co.	to Oct	t. 1, 1	915,					79	40
Judd & Pa											155	00
Northamp	ton 1	Empir	e La	undry	to Oc	t. 16,	1915,				44	93
J. A. Ross	to C	et. 15	5, 191	5, .							271	43
A. McCall											58	45
"Springfie											3	90
New Engl											5	53
J. A. Ross										•	78	74
Total.											\$845	41

The amount paid for interest and insurance offsets outstanding bills by \$194.16.

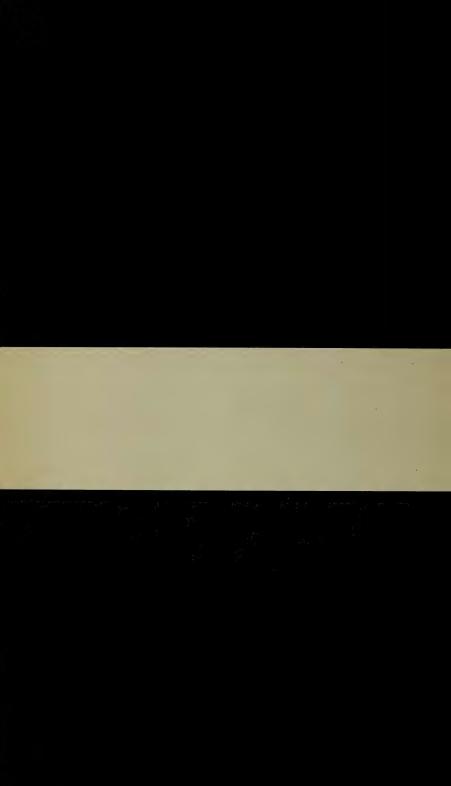
Advisability, Practicability and Costs of taking and maintaining.

The State Forester believes that Mount Holyoke, if acquired by the State, will be of much benefit to the people of that section, and once a State property would interest many others throughout the whole State. This mountain has already become renowned for its wonderful scenic beauty, and no one, no matter how much he has traveled, can begin to appreciate its grandeur until he has taken a trip there or, even better, has spent a day or two at the Mountain House.

This mountain is easily accessible by automobile, and has a splendidly constructed road of comparatively easy grade to the top. It is a landmark well worthy of acquisition by the State for a public reservation for all time. The purchasing of this property by the State, however, should not in my estimation be looked upon as a purely forestry undertaking, for while the arboreal cover may be considered as of great importance in connection with the general effect, it cannot be recommended as possessing economic importance in growing forest products alone, as it has more value from the broad æsthetic standpoint. Much may be done, however, in practicing forestry on the lower slopes, where some economic results

ERRATA.

On page 121, line 24, for \$40,000 read \$50,000; and at bottom of page, for \$50,000 read \$60,000.



can be relied upon; also the whole property is capable of demonstrating good forestry work which would be valuable as an educational object lesson to our people. The impressiveness of many of the beauty spots visited abroad is greatly enhanced by their close relationship to forestry practices, and here could be made, in our own State, a unique example. The property could, if purchased, become a regular State forest, and be managed under the same regulations as other forests now being acquired.

The value of the property, due to the great amount of expense necessitated by the building of the road to the summit, the mountain hotel on top and other reservation buildings, together with the expense of the incline railroad, is a factor that needs to be considered independently of the forestry question. That the first expense of the property in developing it to its present stage was very great there can be no question. The present owners consist of a number of our public-spirited citizens who became interested more from public concern than from the possibilities of profitable investment, and they are interested with others in seeing the property made a State reservation.

When they purchased the property there did not seem to be sufficient public interest, but it was hoped it might develop. It is believed that the time has arrived when the State can now acquire it.

The owners of the property have made the State the following offer for sale of the property through the State Forester. They ask the sum of \$40,000. The whole proposition, it is believed, is well worthy of a favorable consideration by the State. The State Forester has endeavored to make matters clear as to the exact conditions. It is not merely a forestry question. It is a question of preserving for all time to the State a beautiful spot which at comparatively small expense could be made an investment that would grow in value to the State, as it grows in age and tradition.

COST OF MAINTENANCE.

It was demonstrated by the experience of the past season that the running of the hotel for the summer season, besides paying expenses, netted the company a small profit. The present method of running the hotel is that of hiring a responsible proprietor to manage the hotel for the company. Mr. John A. Rowell has been employed during the past two or three years. There seems to be the prevailing opinion that the hotel could be made self-supporting. The entire Mount Holyoke property is looked after by a superintendent who resides on the reservation the year round. Mr. Fred R. Lyman is the company's resident superintendent at the present time, and has been serving in that capacity for many years.

The expense of caring for the roads, forest and farm lands entails a working capital sufficient to handle the property. Should the State purchase the property an extra appropriation of \$10,000 would be required, making a total of \$50,000.

CONCLUSION.

Should the State purchase the property it might be made a memorial to Mr. Christopher Clark of Northampton, whose heart and soul were wrapped up in the preservation of this grand mountain. He died on Nov. 21, 1915, at the age of eighty-eight. Mr. Clark had a deep love for nature, particularly for trees and mountains, was a remarkable character in Massachusetts, and was untiring in his efforts to preserve Mount Holyoke. It is believed the property would have been neglected and undeveloped had it not been for his personal public-spirited interest. Many, and probably most, of the present stockholders subscribed through Mr. Clark's personal solicitation, with no idea of remuneration but to further a good cause. The fond hope of Mr. Christopher Clark, as he expressed it to the forester on the mountain last summer, was that he might live to see Mount Holyoke owned by the State. He was perfecting the data for this report at the time of his sudden death.

Respectfully submitted,

F. W. RANE, State Forester.

MEETINGS AND ADDRESSES.

The department has been called upon as usual to address various organizations and meetings throughout the year. While it has been impossible to do as much of this kind of work as formerly, due to our other numerous duties, nevertheless we were represented at the following meetings during the year:—

Easton, State Grange, fall meeting. Danvers, State Grange, fall meeting. Monson, Agricultural Society. Easthampton, institute meeting. Tyngsborough, State Grange field meet-Plymouth, Commercial Club. Blackstone Grange. American Forestry Association. Lynn City Government. Dedham Board of Trade and Business Men's Association. Ohio State University, Columbus, O. Cotuit Grange. Barnstable town meeting. Athol Grange. Essex Agricultural School.

Society for Protection of New Hamp-

Norfolk Neighborly Club.

Pomona No. 1, Holliston.

shire Forests, Keene, N. H.

Peterboro, N. H., Improvement Association.

Sturbridge Grange.

State Grange field day, Wrentham.

State Grange field day, Charlton.

Duxbury Garden Club.

North Reading Patrons of Husbandry.

Massachusetts State Firemen's Association.

Public moth meeting, Mayflower Grove. Overseers of the Poor Association.

Boston Planning Exhibition, "Shade
Trees and Forestry."

Massachusetts State Board of Agricul-

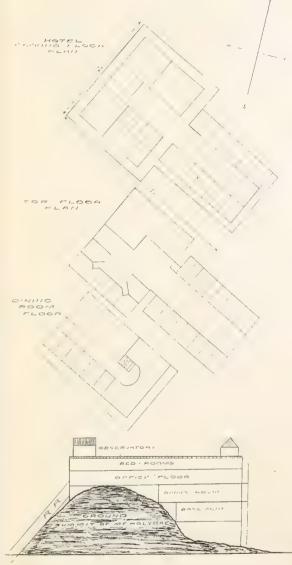
Hampden County Improvement League.

Williams College, Good Government Club.

Massachusetts Agricultural Development Committee.

A J LQUESTION FARIA LAND KIELY JOHN S BARSTOW TYPE

MT. HOLYOKE RESERVATION



PLAN OF MT. HOLYOKE

PROPERTY

SHOWING APPROXIMATE DIS-(TO ACCOMPANY REPORT)

STATE FORESTERS OFFICE 1915









SMALL GROWTH . MIXED HARDWOODS + CONFERS, SCRITCAED + STURTED







Committee on White Pine Blister Rust. State Forest Commission. Mount Grace citizens' meeting. Massachusetts Committee of the Unemployed. Cape Cod Cranberry Growers' Association.

New Bedford Water Works Committee.

Mount Holyoke Company, meeting.

The following address was delivered by the State Forester at Columbus, O., at the dedication of the Ohio State University Forestry Building, Feb. 5, 1915:—

THE EVOLUTION OF AMERICAN FORESTRY.

The part that forestry has played in our development as a nation is a subject well worthy of our consideration on this happy occasion. In dedicating a building to be used for the teaching of forestry at its university, the State of Ohio is simply taking a forward step of fundamental importance. What the forests have meant to this Commonwealth, yea, to our nation, in its development up to the present hour is almost beyond the comprehension of man.

Our forefathers had reason to look upon the forests as a great hindrance. To them they were an obstacle to surmount. It is to the sturdy pioneer, who has with brawn and persistency felled the trees to possess the land for agriculture, the basal industry of the nation, that we must turn to appreciate the real picture of our first period. It was during this period that the log-cabin homes developed a citizenship which gave us the stalwart foundations of our government, and the ideals which we cherish even to this day. The primeval forests in all their grandeur, therefore, were blessings to us as a people in other ways than commercially.

The evolution of the forest in this comparatively new country is interesting. Following the pioneer and his log house came the development of the water-power and the old-time substantial sawmill located upon our streams. During this period every rural community had its grist and sawmill, and about this center the rural town sprang up. The gristmill furnished the flour and the sawmill converted the forest into a commercial commodity. In those days the farmer was the lumberman, for every farm had its woodlot. The average farmer's family was large, and furnished its own labor. During the growing season there was plenty to do in general agriculture, while during the winter this same labor was equally busy harvesting the lumber crop. All hands, together with teams and oxen, were busy getting saw logs off to the mill. Each farmer had his particular pile of logs, and as the sawyer was ready for them he rolled them into the mill, and, as well, went into the pit and drew away his lumber. Saw logs in those days were real saw logs, the larger the diameter the chestier the farmer or his son as he handled them. It was a board of at least a foot in width that was wanted, and such a thing as the commercial New England box board would have been looked upon with contempt. This lumber was taken home and used in the construction of the substantial farm homes which even now dot the countryside. Again, enough lumber was sold to make one hand wash the other. During this period the farmer was the lumberman. During this period, also, a natural forest policy was being carried out. As only the larger or mature trees were cut, it of course followed that those of medium and smaller size were allowed to remain. These in turn shortly grew to merchantable size, and were harvested in like manner. This method kept the land constantly stocked and yielding forest products.

Following the second period came the innovation of the portable sawmill. Through the development of the portable steam engine it was quickly seen that it was a more economic proposition to take the mill to the logs, rather than the logs to the mill. This proved the death warrant to the water-power mill, which tale is told over and over again throughout the land by the many deserted monuments now crumbling upon our streams.

The portable mill period is still with us. As the country has grown older there has been a tendency towards specialization, and the mill man or lumber operator has so perfected the business that he now controls and manages an industry of large proportions. The lumbermen have rapidly spread over the country, until to-day they represent some of our wealthiest corporations, and are called timber barons. Gradually the lumber centers have spread from the east to New York and Pennsylvania, thence to the pineries of Michigan, Wisconsin and Minnesota, and thence to the Virginias and Carolinas. The primeval growths of every section have been exploited and operated, until to-day finds us procuring from our local lumber yards, redwood shingles and sugar pine from the great Pacific Northwest, cypress from Louisiana, white wood or yellow pine from the central south, and Georgia pine from the States of that section. What this natural resource has meant to us is evidenced by the forest products that have been cut in such States as Mississippi and Alabama, Missouri and New Mexico, New Hampshire and Maine, Colorado and Montana, not to mention the great lumber-producing States of the Pacific coast.

The nation could not have developed to its present state of efficiency without our indigenous forest products, for the uses to which they are put are legion. Of what else could we have built our homes or cities and villages, bridges and railroads, constructed our telegraph and telephone lines, propped our mines, traversed the seas, and, in fact, made our implements, vehicles, etc.? Even the by-products, as tar, pitch, turpentine, charcoal, resin, alcohol, tannin, etc., are again important industries, and are essential to our great economic success.

Wood as fuel played a great factor in earlier days, and even now is of importance in many sections. As coal and oil fields become exhausted we may yet return to wood as the most natural and economic fuel.

So I might go on almost indefinitely, but perhaps this is enough to demonstrate the real importance of the forest in our present development. The portable steam and, later, electric sawmills have had their mighty sway throughout the land, and this stage of our development has outrivaled all others.

This rapid development has been shown not only in the utilization of our forests, but to a greater or less extent in the utilization of the other natural resources which constituted our birthright. In our wild rush of development and utilization we have disregarded the future, and lived only in the present, until now we must pause to realize that this kind of development is effective for a time, but extremely wasteful in the end. "Conservation," a term which expresses in one word caution and economy, has of late been the slogan of our constructive and thoughtful people. This campaign first originated in forestry, but was quickly applied to the conservation of all our natural resources. We have reached that stage in our national development when we must of necessity not only employ rational and sane principles of conservation, but must take a further step in the restoration of our inexhaustible resources, like forests. Waste, mismanagement and forest fires have destroyed enough of forest resources alone to have supplied our wants for many years to come, not taking into account the effect upon stream flow, the denudation of the soil and other correlated calamities.

But why should we concern ourselves with the water that has flowed over the dam! It is the future in which we are now interested, and as we meet here to dedicate this building to forestry we feel confident that the great State of Ohio fully recognizes the importance of what forestry may be to Ohio's future, —nay, must be, provided she realizes her greatest success.

Now that Ohio has erected this building to forestry development and instruction, it will naturally follow that from this, as a center, much of a constructive and practical value will be disseminated. A knowledge of tree life, either from the economic or æsthetic standpoint, appeals to the average citizen, and an opportunity to study forestry during the formative stages of student life should be at his command. It is a mistaken idea, but one we are prone to accept, that a study of forestry is of use simply to the would-be forester, lumberman or farmer, while really a knowledge of trees and forests will give a touch of pleasure and inspiration to the traveler, writer, sportsman, poet, artist, or even literary genius, that no other subject can replace. In these days of specialization we need a blending of knowledge on the part of our students that we may still retain standards of real culture. I therefore recommend courses in fundamental forestry, at least, to all university and college students.

One of the greatest pleasures on the part of our American tourists when visiting Europe in recent years has been the trip to the renowned Black Forest country of Germany. Many of these same people, who have had little interest in our own woods, other than to deplete them, find here a kindly respect and reverence for trees and forests. Where can one get greater delight than tramping through this unique country? These splendid forests not only are beautiful, but they are handled so dexterously

that they solve the great economic problem of supplying forest products, and give constant employment to an army of men. In turn, the municipal forests are to many of the smaller towns and cities what large areas like the Black Forest are to the nation. Here again we do well to study and emulate their example in Ohio and elsewhere. These forests play a very important part in not only paying a large part of local taxes, and furnishing work for the inhabitants, but they really constitute the playgrounds of the nation.

In the past we Americans have felt our duty accomplished when we have established parks and public squares in the center of our villages and cities. These are all right so far as they go, but they cannot be compared to larger areas where our people, young and old, could love and enjoy nature on a more pretentious scale. It is time that our educators in schools and colleges get a clear vision of the benefits to come from the outdoor life. The forest, with its abundance of wild bird and animal life, flowers, shrubs, etc., offers a great field for developing a happy and contented people.

High ideals in forestry development, combined with careful methods of education, form the only real solution of the forestry question.

It is no longer a question of simply harvesting the crop, but one of growing a crop that we may have one to harvest. It is going to take time for our men of affairs, who have been busy operators of lumber, to accept the larger and broader viewpoint, and regulative legislation, both national and State, must be called in now and then to ameliorate conditions.

Already much has been accomplished. We have a national forest service which has done much in recent years to interest our people in the subject. Many of our States have a forester or commissioner who is clothed with the responsibility of formulating a State forest policy. In this work, as in all others, it is extremely important that they should cherish the fact that they are molding the foundations of great future possibilities in forestry, provided the work is laid out on a broad and comprehensive plan. While forestry is new with us, it nevertheless has been practiced in Europe for centuries, and the great good to come to any State that encourages its practice is evident to all who are competent students of the subject.

We Americans are slow to act, but once we have satisfied ourselves that we are on the right path nothing daunts us. In this connection may I venture to say that now that Ohio has a splendid new building, where the department of forestry is happily housed, the next step that should follow is that of creating the position of State Forester. Surely the great State of Ohio, with its gigantic manufacturing, agricultural and mining industries, can find a perpetual use for all the forest products that she can grow, and local production brings about conditions for an economic success that otherwise would be impossible. Ohio should have a well-defined State forest policy. It is just as important that our depleted and worn-out lands, that originally should never have been cleared for agriculture, be returned to forests, as it is that we practice better farming upon the lands

now under cultivation. While I am not sufficiently familiar with this State to point to specific examples, nevertheless I dare say there are thousands upon thousands of acres of land that are too rocky. mountainous, sandy, moist, hilly, stony, etc., to be of value to anybody. These same lands, however, were originally covered with a heavy growth of timber, and they should be returned to that condition. accomplish this task will need direction and a due sense of responsibility on the part of a State forester. Ohio is a natural forest country, and it is none too early for the State to establish demonstrative State forests on just such lands. It is unreasonable to expect private capital to undertake this work until it is shown that the investment is practical. Also the great danger from forest fires must be eliminated by instigating Statewide systems of patrol and management. Forest fires should be as systematically and effectively combated in the country as our city fires are. There is little use of advocating reforestation without first giving sufficient fire protection. Much has been done in some States in the way of installing lookout stations and forest-fire fighting equipment. Massachusetts has 26 lookout stations and 353 forest wardens, besides 1,800 deputy forest wardens, as her fire-fighting organization. The Massachusetts forest warden, who is an official appointed by the selectmen in towns and the city government in cities, subject to the approval of the State Forester, is clothed with the following powers and duties: -

No warrants can be paid for fighting forest fires without his approval. He may compel any citizen between the ages of eighteen and fifty-one to assist in fighting forest fires, or may impress teams and implements. No fires may be set out of doors from March to December without a permit from him. He appoints his own deputies, has the power to arrest without a warrant persons caught setting fires, and is responsible for the disposal of brush and slash. He also is of assistance to assessors in securing data for forest taxation. These are some of the more important of his duties.

A State forest policy should embrace and regulate the following subjects: —

Expert services should be given without expense, except for travel and subsistence, to anybody in the State, particularly emphasizing forest planting on the part of the farmers. Forestry literature of a practical nature should be disseminated whenever there is a call for it, the most economic utilization of all forest products should be carefully studied, and a modern system of taxation should be adopted in every State. A nursery would prove of great assistance in planting State lands, while in many States small trees might be sold at cost. The poorer towns should be given State aid in the purchase of forest-fire fighting equipment. Five hundred dollars will make a very good beginning. Each State needs to regulate the disposal of its brush and slash, since some of the worst fires get their momentum from its being allowed to remain. Also, all railroad engines burning wood, coke or coal should be inspected, to see that they are properly protected with spark arresters, ash pans and grates.

Other regulations worthy of mention are as follows: —

The Governor should have the power to proclaim the hunting season closed during a very dry time. Fish and game deputies should have the same authority as regards forest fires as the forest wardens. The boy scouts should be utilized as fire fighters, and the rural mail-carriers be compelled to report all forest fires to the forest warden or his deputies.

In conclusion I wish to touch upon one other subject, and that is the outlook in the future for a well-equipped forestry student. This is a subject about which all foresters are being asked. Forestry has come into importance rapidly of late, and forest schools have quickly sprung into existence. When the writer was a student in this university, 1888 to 1891, there were no forestry schools in the country, and all have been of comparatively recent origin. The men who are in the more important forestry positions to-day received their education through personal love and devotion to the subject, and they were their own instructors. forestry schools and departments in our universities and colleges are awakening a real interest, and training young men in a profession which is bound to grow in importance and value. Not all young men who choose the profession necessarily will make a success in it, but I can see no reason why there are not many openings for those who really love the outdoor associations and rugged life of the forester. We certainly are going to need an army of well-trained and efficient men to construct and carry on the work already begun in some of our States, and to organize and develop forest policies in a large number of States where at present little, if anything, has been attempted. I have little patience with the man who is constantly foreseeing every profession filled up and no chance for the future. If a young man has the right kind of stuff in him, and forestry appeals to him, I predict he may find a field here wherein he can not only earn a livelihood, but he can be of great service to his State and nation also.

With this new building, and with the inspiration that its classrooms, laboratories and library will afford, coupled with the wholesome environment that will ever prevail so long as our own Professor Lazenby and his policies persist, I am sure forestry at the Ohio State University will ever be taught and dispensed to Ohio's sons and daughters with delightful satisfaction.

I congratulate the university and the great State of Ohio in its splendid forestry endeavor, and wish even greater things for you in the future.

NEW LEGISLATION.

No legislation of particular importance relating to the work of this department was passed at the last session of the General Court. The law relative to the sale of arsenate of lead was amended so as to read as follows:—

CHAPTER 80, GENERAL ACTS OF 1915.

An Act to authorize local moth superintendents to furnish arsenate of lead to towns.

Be it enacted, etc., as follows:

Section 1. Section one of chapter six hundred and five of the acts of the year nineteen hundred and thirteen is hereby amended by striking out the words "now receiving aid from the commonwealth in suppressing the said insect pests", in the third and fourth lines, — so as to read as follows: — Section 1. For the purpose of assisting in the extermination of gypsy and brown tail moths, the local moth superintendent in any city or town is hereby authorized to furnish, at the cost thereof, arsenate of lead to any owner of real estate situated within the limits of such city or town. Material purchased under the provisions hereof shall be used only for the suppression of gypsy and brown tail moths and only upon land of the purchaser.

Section 2. This act shall take effect upon its passage. [Approved March 18, 1915.

The law requiring the mayor of cities and the selectmen of towns to send notices to owners of property infested with gypsy and brown-tail moths was amended, giving to said officials the authority to publish the notice in newspapers published or circulated in the city or town at least three times during the month of October if in the opinion of the mayor or selectmen such publication will be a sufficient notice.

RECOMMENDATIONS.

- 1. As the gypsy-moth conditions menacing the cranberry bogs in southeastern Massachusetts have become very grave, the work of the suppression of this insect in that district calls for due consideration and sufficient funds to cope with the situation.
- 2. The law requiring permits to set fires in the open air should be so amended as to apply to all cities and towns in the Commonwealth.
- 3. It should be the duty of every city and town to provide itself with the proper facilities for housing its forest fire and moth equipment in some suitable place.
- 4. It is believed that our forest-fire work can be greatly strengthened and made more effective, provided we establish in each

State forest-fire division, of which there are four, an auto truck equipped with fire apparatus, to be used as an auxiliary in such towns as find they need extra assistance. This equipment is just the aid needed many times to control a fire situation, and, being State property, would be in touch with the lookout observers and division wardens, and manned by the State Fire Warden's men during the dangerous fire seasons. As there is an unexpended balance each year of the appropriation made available to reimburse towns for forest-fire fighting equipment, it is recommended that legislation be enacted authorizing the State Forester to apply this unexpended balance to the purchase of the equipment outlined above.

5. The white pine blister rust, one of the diseases of the white pine, should be given due consideration at the hands of our various State officials, particularly the pathologist of the Agricultural Experiment Station and the State Nursery Inspector, in determining our conditions as regards this disease. Some definite policy of holding the disease in check, or exterminating it if possible, should be arrived at. It is believed that while this disease may become very destructive to our white pines, nevertheless the danger is not sufficient to discourage prospective planters of the white pine. It is not our purpose to minimize the importance of this disease, nor do we intend to lessen our endeavor to combat it. We do, however, believe it a good policy not to overexaggerate the question, and thus necessarily deter the constructive work of reforestation, until there is more convincing proof than is to be had at present that the disease is likely to become a great menace to white pine. It is to be hoped that the average Massachusetts citizen will go ahead planting white pine as enthusiastically as ever, leaving the problem of its protection from diseases and insects to be looked after by technically trained officials.

> F. W. RANE, State Forester.



STATE

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1916



THE

STATE FORESTER

OF

MASSACHUSETTS.

THIRTEENTH ANNUAL REPORT, 1916.

F. W. RANE, STATE FORESTER.



BOSTON:

WRIGHT & POTTER PRINTING CO., STATE PRINTERS, 32 DERNE STREET.

1917.

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The Commonwealth of Massachusetts.

To the General Court.

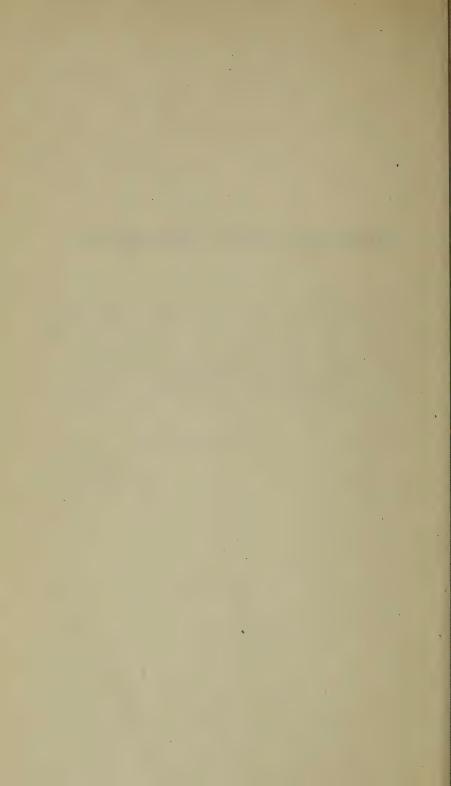
In accordance with the provisions of chapter 409, section 5, Acts of 1904, it is my duty and also my pleasure to submit the annual report of the State Forester for the past year.

It is certainly gratifying to the head of a department to have had such whole-hearted co-operation as has been accorded us.

Respectfully submitted,

F. W. RANE, State Forester.

DEC. 23, 1916.



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A white pine forest fringing the State highway between Gardner and Greenfield. Here is an example of how the economic and æsthetic go hand in hand. One might believe this a scene in the black forest country of Germany. Let us have more of them in this State.

The Commonwealth of Massachusetts

THIRTEENTH ANNUAL REPORT OF THE STATE FORESTER.

INTRODUCTION.

Splendid co-operation and a definite growing interest in all forestry matters on the part of our citizens, whether they are officials or otherwise, have been manifested everywhere throughout the State during the past year.

The assistants and district men in this department unanimously speak in their annual reports to the department of the increased interest and co-operation accorded them everywhere. Towns and cities have raised money and turned it over to the State Forester's Department for the erection of suitable forest-fire towers, for trimming, planting and improving the trees in the highways, for planting watersheds, and for forest fire-fighting equipment. These, together with the many courtesies shown us throughout the State, lead us to feel that we are indeed public servants who are welcomed by our citizens.

During the past year many conferences of forest wardens were held in different parts of the State, and a general meeting of all moth superintendents was held in Boston during the winter.

The co-operative work between the cranberry growers and the State Forester's Department in combating the gypsy moths in the cranberry bogs has apparently been productive of good results.

The wood utilization work in progress for the past few years was continued with increasing interest and has given practical results.

The forest survey of Worcester County, which has been under way for the past two summers, is completed and a bulletin containing the results will soon come from the State printer. A similar survey of Plymouth County was also carried on during the past summer, but the data have not yet been compiled. This information will be very valuable in determining the amount and kinds of our forest areas.

The State Forest Commission has increased the acreage of lands for State forests and now we have three such forests: the Otter River forest in Worcester County; the Myles Standish forest in Plymouth County; and the Harold Parker forest in Middlesex and Essex counties. The total area of the three approximates 9,000 acres.

The department has made several exhibits at various fairs and public gatherings which will be alluded to elsewhere in this report, as will also be found the lists of public addresses given and meetings attended by the State Forester and his assistants during the year.

The white pine blister rust, an imported disease affecting the five-needle pines, which has been found in this country in recent years, has received a great deal of attention by the department during the year. Many outbreaks have occurred in the State, and it has been our purpose to ascertain the extent of this disease, together with a method for its eradication.

In many respects the comparative contrast of last year and the present season is interesting. While 1915 was noted for the overabundance of unemployed labor, the State Forester's Department being called upon by the General Court to find employment for hundreds of men in all sections of the State, that they might at public expense earn a living, this year the demands for labor have been so great and the competition so keen that it has been very difficult to secure sufficient employees at prices commensurate with our appropriation, to carry on the work necessary to be done. In average seasons the local town and city forestry officials are constantly besieged to take on more labor than they can handle economically, and this opportunity for selection tended to raise the standard of efficiency. But this year practically all our officials were constantly short-handed and compelled to get along as best they could.

This season has been a great contrast also to others of recent years in the great amount of precipitation or rainfall. It rained more or less practically every day until early fall. Our trees and forests have gloried in an extremely heavy and healthy foliage, which has been a pleasure to look upon throughout the whole season. The extremes of drought and high temperatures of recent years combined with insect and disease depredations, not to mention the constant menace from forest fires, have strained tree patience, if that term may be used, but the past season has certainly encouraged them to regain much of their old-time vigor and sturdiness.

The reforestation work this year has been remarkably successful. Nearly every small tree that was planted has lived, and all naturally stocked plantations have made equally fine showings. Some of the older plantations have made remarkable strides, it not being uncommon to see a growth of $2\frac{1}{2}$ to 3 feet on white pines four to six years set, and in one case a measurement of 42 inches was made. It stands to reason that seasons capable of giving such good results must enable trees and vegetation generally to reserve more or less potential energy so that they may overcome or resist relatively unfavorable conditions for a time at least.

One of the most healthy signs is the good will on the part of boards of selectmen in towns and officials in cities toward our forestry and moth work. Instead of the tendency to change local officials yearly and an indifference to their work, which was now and then evident in earlier days, we are finding that these officials stand ready and are willing to assume the responsibility necessary to accomplish desired results. fact is evidenced by the better equipment our towns and cities have acquired, the business way that the work is financed, and by no means the least factor, the whole-hearted and earnest way in which the men whom they appoint undertake the work. The response that has come from towns and cities to the request made by this department last year in suggesting that suitable sheds and storage houses should be provided for the forest-fire and spraying equipment, tools and supplies, has been indeed most gratifying. Already many not elaborate but very suitable buildings have been provided. Here the local

official has his headquarters, and it affords him an opportunity to employ his time to advantage when otherwise he would be unable to do so.

The amount of so-called private work performed by the local forestry officials is an index as to their standing and appreciation in the community. It is perfectly apparent that people generally are turning to them for advice and assistance, and this is nothing other than natural.

The State Forester has been criticized at times by a few contractors for encouraging the city and town officials in offering to aid private owners, particularly in moth work. While it has never been the policy of this department to encroach upon the legitimate occupation of those who engage in the business of spraying and caring for trees, nevertheless the basic law of the State Forester's office is to assist our people whether in a public or private capacity in combating moths, which are declared a public nuisance, and in encouraging modern forestry in the best and most economical way possible. It is inevitable that on account of the elimination of the expense of equipment and supervision, the towns and cities should find it possible to do the work more cheaply than contractors.

There is little occasion, however, for being disturbed over this question at the present time for there is plenty of work, it is believed, for everybody, and the State Forester desires to express his high appreciation of the many concerns and individuals who are engaged in spraying and forestry work, and to say that it is most highly appreciated and much needed, and it is believed will be for some time to come.

It is always a pleasure to recommend contractors who are honorable in their dealings, and we make it an object to have a list of these concerns in the office, to which we refer requests as they come in. On the other hand, it is our duty as well to caution and protect our people from impostors who are constantly appearing in different sections under the guise of experts.

The State Forester was especially gratified in the pleasing recognition given his department in the annual address of the master of the Massachusetts State Grange, Mr. Edward E.

Chapman, at its recent meeting held in Boston. At the same meeting the committee on forestry recommended several resolutions which the grange adopted, all of which showed valuable interest and support of forestry work in Massachusetts. Besides the State Grange, the State Board of Agriculture, the previous week in annual session, passed three resolutions favorable to forestry matters of interest to this department. More recently the Massachusetts Tree Wardens and Foresters Association, which is composed largely of the officials in cities and towns in charge of tree and forestry work, has voted to recommend certain legislation to the incoming General Court toward unifying and perfecting the care of shade trees and forestry in cities and towns.

Many other important activities of this department might be called to the reader's attention, but some of them have already been alluded to in previous years, and others will be touched upon in other parts of this report. The chief desire of the State Forester is that this department may continue to have the splendid co-operation and support of our Massachusetts people that has always been accorded us in the past.

ORGANIZATION.

We are fortunate in having had but very few changes in the personnel of our working force throughout the past year. Mr. Frank L. Haynes, who has been forest examiner on the general forestry staff, was transferred to a similar position in the employ of the State Forest Commission. As Mr. Haynes worked all summer in the actual engineering work of the Commission and was paid by it, the transfer is more on paper than otherwise.

Arrangements have been made with the Massachusetts Agricultural College whereby Mr. W. D. Clark, the professor of forestry, will act in the capacity of assistant State Forester as has heretofore been the practice with the professor of forestry at the college. This arrangement is of benefit to both the college and the State Forester's department, as it enables both State organizations to co-operate harmoniously. Although Professor Clark's time of necessity will be largely employed

in teaching and college work, nevertheless, should he have the time and inclination to do so, he will feel free to enter into the regular work of the State Forester's department. One of our forest nurseries is located at the State college, and Professor Clark is taking general supervision over it.

A new departure has been made in placing a forester at Springfield, whose duty it will be to give advice and assist people in general in the western part of the State. This work has been started in conjunction with the Hampden County Improvement League, a very wide-awake organization with headquarters at Springfield. Mr. Charles R. Atwood, a graduate of the University of Maine, a young man who has been in our employ in forest utilization work for over a year, was delegated to this work.

The work heretofore carried on by Mr. Ray F. Weston, with headquarters at Middleborough, has been put in charge of Mr. Lithgow Hunter, the former having resigned. Mr. Hunter is a practical forester, who has been in the employ of this department for the past year and a half and merits the advance.

The organization is at present as follows: —

GENERAL STAFF.

F. W. RANE, B.Agr., M	I.Sc.,		State Forester.
C. O. BAILEY,			Secretary.
ELIZABETH HUBBARD,		4	Bookkeeper.
ELIZABETH T. HARRAGI	HY, .		Stenographer.
JENNIE D. KENYON, .			Stenographer.
MABEL R. HAMNETT, .			Clerk.
ROBERT HARDING, .			Office boy.

GENERAL FORESTRY

				GE	NEIKA.	L 1	ORESTRI.
F. W	. RANE, B.	Agr.,	M.Sc.	,			State Forester.
H. 0	. Cook, M.	.F.,					Assistant forester in charge.
W. I). CLARK, N	M.F.,					Assistant forester (Amherst).
J. R.	SIMMONS, I	B.Sc.,					Reforestation work.
Сная	R. ATWO	ор, В.	Sc.,				Assistant forester (Springfield).
JAME	s Morris,						Agent.
EBEN	Змітн,						Superintendent, Barnstable Nursery.
J. A.	PALMER,						Superintendent, Amherst Nursery.
J. L.	PEABODY,						Field foreman.
H. N	. BUTLER,						Field foreman.
н. н	. CHASE,						Field foreman.
DEAR	TOWNSTE	v					Field foreman

STAFF MOTH WORK.

. State Forester. F. W. RANE, B.Agr., M.Sc.,

GEORGE A. SMITH, . . Assistant (equipment, accounts, etc.).

PAUL D. KNEELAND, M.F., . Assistant (woodlands, products, etc.).

. Assistant. LITHGOW HUNTER, . . . GUY W. LUCAS, B.Sc., . Assistant. FRANCIS V. LEAROYD. Supplies.

DISTRICT MOTH MEN.

1. JOHN W. ENWRIGHT, Medford. 5. HARRY B. RAMSEY, Worcester.

6. C. W. PARKHURST, Foxborough. 2. SAUL PHILLIPS, Beverly.

3. JOHN J. FITZGERALD, Haverhill. 7. W. F. Holmes, East Braintree. 4. Wm. A. HATCH, Marlborough.

8. J. A. FARLEY, Plymouth.

STAFF, FOREST FIRE PREVENTION.

F. W. RANE, B.Agr., M.Sc., . State Forester.

. State Fire Warden. M. C. HUTCHINS, . .

JOSEPHA L. GALLAGHER, . Clerk.

. Locomotive inspector. JAMES E. MOLOY, .

. Locomotive inspector. MINER E. FENN,

DISTRICT FOREST WARDENS.

1. OSCAR L. NOYES, Byfield. 3. JOHN P. CROWE, Westborough.

4. ALBERT L. ORDWAY, Westfield. 2. Jos. J. SHEPHERD, Pembroke.

OBSERVERS.

CALVIN C. PARKER, North Harwich. ROBERT McLAUGHLIN, Millville. JOHN P. GIBLIN, Westborough. CALVIN BENSON, Barnstable. JAMES MALEY, Princeton. W. I. Moody, West Falmouth. W. F. RAYMOND, Bournedale. P. B. Coles, Warwick.

FRANK L. BUCKINGHAM, Plymouth. GEORGE W. CLIFFORD, Amherst. S. Edward Matthews, Middleborough. George B. Sherman, Brimfield. JOHN H. MONTLE, Fall River. CHARLES PUTNAM, Westfield.

N. C. WOODWARD, Shelburne Falls. R. J. ZILCH, Attleboro.

H. H. FITZROY, Savoy. CHAS. F. KIMBALL, South Hanson. JOHN H. BACON, Sharon. GEORGE LAURENT, Chester.

FREDERICK R. STONE, South Sudbury. JOHN E. CURTIN, East Otis. CLAYTON BUNT, Great Barrington. JOHN H. O'DONNELL, Greenwood.

HENRY H. HAMMOND, Chelmsford. ROBERT MILLER, Pittsfield.

FREDERICK W. OLIVER, Georgetown. CLIFFORD GEORGE, Williamstown. MILES O. BURNHAM, Essex.

For list of forest wardens and local moth superintendents, see page 113.

STATE FORESTER'S NEW QUARTERS.

This department has finally been housed in the State House and we may be found in the new east wing on the fourth floor, with entrance at Room No. 408. These new quarters will be our permanent home, and it is believed that being in the State House, where city and town officials come naturally for so many avenues of business relations, will facilitate matters very much. While our old headquarters were but a short distance away, it required an extra effort to look us up, and undoubtedly many very important calls that might have resulted in much good have been missed.

We invite, therefore, all citizens and organizations interested in everything that pertains to forestry to make our permanent new home the headquarters and the center for all forestry activities of the State.

CORRESPONDENCE COURSES ON SHADE TREE MANAGEMENT AND FORESTRY.

The State Forester has made arrangements with the Massachusetts Agricultural College authorities for correspondence courses, and has requested all town and city officials whose work has to do with trees and forestry to take the courses on these subjects in order that they may have a first-hand knowledge of the fundamentals of their work. The State Forester's division men have taken samples of these courses about the State with them, and explained their purposes and methods to the officials in cities and towns. A number are already enrolled, and it is predicted that this will be an interesting and extremely valuable undertaking.

Arrangements have been made to have special emphasis laid upon the white pine blister rust disease, so that next spring the men having taken the course will have the benefit of some theoretical knowledge on this subject, which, with their practical training, will help to make their services more valuable.

It is believed this is the first definite work of this kind attempted by any State, and, if it works out satisfactorily, it will furnish a good basis to future care and management of shade trees and forests.

RELATIONS OF BIRDS AND TREES.

The importance of the birds in protecting our trees against insect pests cannot be too strongly emphasized, and a great deal of good work can be accomplished by private landowners and others if they will only take active steps to encourage the increase of the insectivorous birds.

The State and Federal governments are exerting every effort to suppress the gypsy and brown-tail moths by all the wellknown methods of spraying, banding, creosoting, etc., as well as by introducing numerous varieties of parasites.

What we have got to count on ultimately are the natural methods of suppression, i.e., the birds and parasites, but until the infestations are under control every known method of suppression will have to be resorted to, and this undoubtedly means strenuous work for some time to come. Where the public can help to great advantage is to take an active hand in bringing about an increase of the birds. This can be done to best advantage by individuals rather than by the State.

The methods of encouraging the birds are very fully set forth in the numerous publications by both the State and Federal governments.

During the year the State Forester has been fortunate in making the acquaintance of Mr. John C. Lee of Wellesley, Mass., who is an ardent nature student and bird enthusiast. He has been able, through perseverance and skill, to produce a practical bird house, which is within the reach of any one, as it sells for five cents. Of course this is simply actual cost, no profits to any one. He also has innumerable original devices and ideas relative to the housing, protection and care of birds that the writer believes are bound to aid bird lovers in their future endeavors to get practical results.

WHITE PINE BLISTER RUST.

This department has planted millions of white pine trees during the past ten years and it still has millions in its nurseries waiting to go out. Considering this and the fact that the white pine is really the most valuable commercial tree in the State, we challenge the statement that any one is more

concerned than this department in the welfare of this noble and beneficent tree.

We have every reason to be interested in this disease, and we propose to do everything within our power to cope with it. In last year's annual report it will be remembered that definite recommendations were made on the whole subject. The work of the past season having shown that the disease is more wide-spread than we had expected to find it, we now need some definite and drastic methods of coping with it. While there are diverse opinions among would-be authorities as to its virulency, just how long it has been in existence in this country, etc., and while any one's opinion should at least be respected whether ultimately right or wrong, nevertheless we all can agree that now is the time to act, and no time should be lost in establishing definite public policies of eradication. It is going to require continued public funds that should be expended judiciously, whereby results will naturally follow.

We in Massachusetts have had valuable training in forestry work in the suppression, largely at public expense, of obnoxious insects, and it is believed that this experience alone if taken advantage of can be made one of the most potent forces in dealing a death blow to this white pine blister rust disease.

The State Forester delegated one of his assistants, Mr. J. R. Simmons, to keep in close touch with the work throughout the year, and the following is a brief report on the subject by him. It contains many things likely to be of interest to the reader.

Announcement was made in last year's annual report of the presence in Massachusetts of the white pine blister rust, a fungous disease having two hosts, the five-needled pines and the currants and gooseberries (Ribes). A summary of the work of investigation and eradication to date was given at that time. During the past year funds amounting to \$27,000 have been appropriated—by the State, \$13,000, and national governments, \$14,000—for the purpose of further investigating the blister rust disease in Massachusetts. The State Nursery Inspector, Dr. H. T. Fernald, under whose direction the money has been spent, has covered the entire State, and has issued a report in which he describes the work done by his department and gives the location of all infections found. The reader is referred to this report for the present distribution of the disease in Massachusetts.

There is at this time no appropriation by which the State Forester is authorized to investigate or combat the blister rust disease, but, having at his command a competent organization in the personnel of his district moth superintendents and field foresters, he has undertaken the training of these men in readiness for any situation in which they may be called upon to act. Every infection found by the employees of this department, whether on pine or *Ribes* has been reported to the State Nursery Inspector, and, whenever their work could be so arranged, the field foremen have done scout duty under the instruction of Dr. Fernald's inspectors. All State plantations on which imported stock was used have again been examined, and all diseased trees removed. This phase of the work included the investigation of nine lots, from which, in all, 232 trees were taken and burned. However, with the exception of a few trees removed from the so-called Muddy Pond lot in Westminster, none of these specimens had died from blister rust.

In October, 1916, a letter was sent to every local moth superintendent and forest warden in the State, with the request that he investigate the gardens in his city or town for cultivated varieties of *Ribes* showing blister rust infection, and that specimens of leaves be sent to the State Forester's office. By this method a large area, representing all sections of the State, was covered, and forty-five *Ribes* infections were definitely located, nearly all of which were found on the *black currant*. The investigation was undertaken for its educational value, and was followed up by a letter of instruction to the town and city forestry officials.

An extensive territory has also been covered in the course of routine work by the assistant foresters in charge of general forestry and reforestation. In response to a large number of applications on the part of individual landowners for forest land examinations, 86 estates or land holdings have received attention to date. Twenty-five per cent. of these were examined for blister rust as the chief object of investigation, and a total of ten infections (six currant and four pine) were found. It is but fair to say that of the four pine infections, three were in artificial plantations, and the remaining one included but a single diseased tree. Two infections were located in the same town, where the blister rust is known to have existed for a number of years.

The findings of this department up to the date on which the annual report goes to press may be briefly summarized as follows:—

- (1) There is a general infection on *Ribes* over most of the area of the State, indicating the spread of the disease this season in the summer spore stage on *currants and gooseberries*.
- (2) There is a light infection on pine, confined to plantations made from foreign stock, doubtless diseased when planted, or to native pine stands where currants and gooseberries have been growing in the near vicinity for many years.
- (3) There are considerable numbers of large trees on which diseased branches have been found and removed, trees which, in themselves,

were comparatively strong, but which, if uncared for, would act as disseminators of the disease to currants and gooseberries, and thus in time to other pines.

(4) The progress of the disease on *pine* has thus far been slow, and only a very small percentage of trees which have died from various causes have been killed by the blister rust.

In view of the fact that the State Forester has received a large volume of letters, and quantities of specimens of Ribes leaves, pine branches, twigs and needles from individuals who were erroneously convinced that their pine stands were infected, the following diseases, which may be mistaken by the uninitiated for blister rust, are worthy of note. Currants and gooseberries are often attacked by the leaf spot (Septoria ribes Desm.) and the anthracnose (Pseusopeziza ribes Cleb.) both of which may cause complete defoliation of the bushes. These diseases are, however, confined entirely to Ribes and are, therefore, no menace to pines or other trees. There is another rust which attacks the current and gooseberry in the early spring, usually before the blister rust (Cronartium) appears. It occurs on the Ribes in the so-called cluster cup stage, which corresponds in the life cycle to the stage of the blister rust found on the pine. It is bright orange in appearance and only one or a very few spots usually occur on a leaf. Pines suffer from a number of minor diseases, and young pines are especially susceptible to attack by the white pine weevil, whose borings on the inside of the main shoot often cause a swelling of the small lateral branches not unlike the early stages of blister rust. There is a fungous disease (Phoma) which makes its appearance on young pines near the ground, girdling the trunk, causing a swelling above the point of infection, vellowing of the needles and final death of the tree. This disease is probably more often confused with blister rust than any other now known. Another enemy of the young white pine is the Hylobius pales beetle, which breeds in the bark of pine stumps and feeds on the bark of young pine trees. It has been often assumed by those not familiar with this insect that his marks were those of some small animal, such as a squirrel or mouse, which had been attracted by the honey-like resin of a rustinfected tree. In such cases the damage has been wrongly attributed to blister rust rather than to the work of the insect. An excellent bulletin on this pest (by Prof. E. E. Carter) can be obtained from Harvard University, Department of Forestry. Mention should also be made of what has commonly been termed "pine blight," due to climatic conditions, and not considered in any way a serious menace. Scattered trees have turned brown during the past summer over most of the area of Massachusetts. If the tree is generally healthy, it will almost always recover.

The white pine blister rust is also further discussed in a paper printed elsewhere in this report entitled "Forest Depredation and Utilization." The bulletin that every one interested

in knowing about this disease should have is Farmers' Bulletin, No. 742, by Dr. Perley Spaulding. This bulletin is sent free upon application to the United States Secretary of Agriculture, Washington, D. C.

ROADSIDE THINNING.

A method of moth suppression along our roadsides is based upon the idea of removing the gypsy moth plant foods from those species of trees and shrubs which are less liable to or even immune from caterpillar depredation.

This form of work has been carried on to a greater or less extent for the past seven years and has now been extended over several thousand miles of roadsides. It might be termed an application of proper forestry methods to the roadsides, and if these same methods could be extended throughout the woodlands, the gypsy moth problem would be for the most part permanently solved.

Neglected roadsides are usually filled up and literally tangled with a profuse growth of trees, vines, brush and shrubs.

The initial cost of thinning a locality of this description is undoubtedly greater than that of any other method of gypsy moth suppression, but when the permanent benefits are considered, the difference in cost is discounted. Briefly, the first act of thinning is to remove the oak, gray birch, willow, poplars, black cherry, hop-hornbeam, alder, witch-hazel, apple and all tangled brush, shrubs and vines. Occasionally it is possible during the first cutting to retain certain ornamental shrubs and vines but not generally, for owing to the massed condition of the undergrowth very little form is left to the weaker and more ornamental species of shrubs.

After removing the species named, we have left to constitute our roadside trees the evergreens of all varieties, maple, hick-ory, locust, ash, butternut, chestnut, black birch, yellow birch, white birch, ailanthus, beech, tupelo and elm. For a period of years following the thinning treatment it will be found necessary to cut over these localities with a brush scythe to suppress the sprout growth springing from the stumps previously cut. Therefore it is most necessary that during the first thinning the stumps should be cut close to the ground.

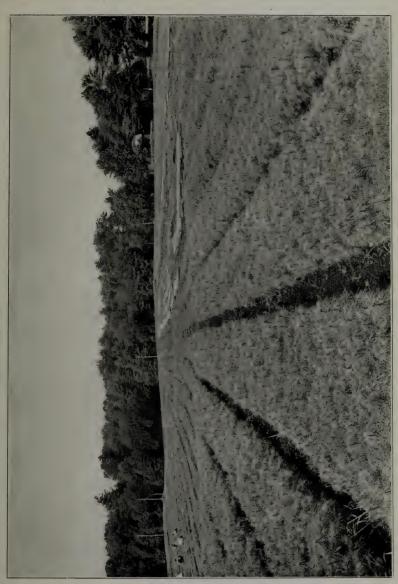
After thinning work had been carried on throughout the State to some extent, many people interested in native plant life made inquiry concerning the resistant qualities of certain shrubs in regard to gypsy moth depredation, and this led to a study of the subject. The result proved most of our native shrubs to be highly resistant and many immune. As a consequence, the State Forestry Department recommended in brush-scythe work following roadside thinnings the retention of the following-named native shrubs: the several species of the Cornus family, viburnums, sumach, deciduous holly, clethra, ceanothus, buttonbush, mountain laurel, bayberry, shad, benzoin, sweet fern, elder, azalias, lilac, and the various species of our native vines which are all resistant, woodbine, bittersweet, grape, ivy and wild clematis.

These vines and shrubs not only serve as a caterpillar repellent, but they constitute an attractive undergrowth beneath the roadside trees and serve to cover unsightly stone heaps, gravel pits and walls.

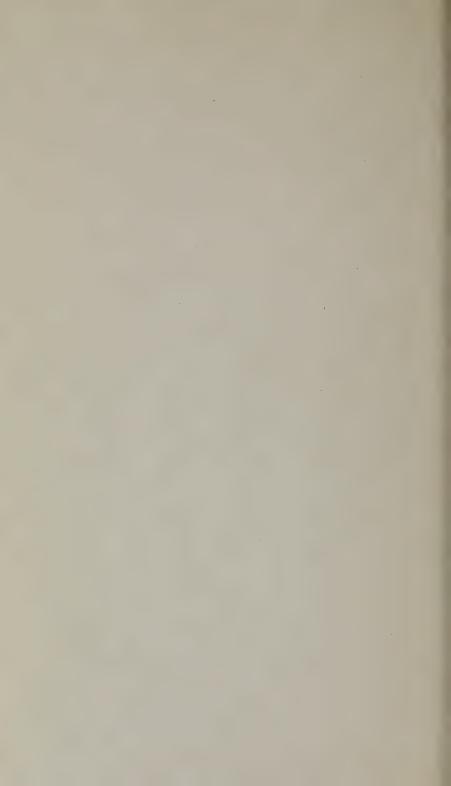
Roadside thinning in the manner described is an effort to do away largely with all other forms of gypsy moth treatment on our outlying roads except the simple one of cleanliness, and is carried to varying depths of from 15 to 50 feet from the edge of the road.

GYPSY MOTHS AND CRANBERRY BOGS.

The destructive work of gypsy moths on cranberry bogs was found to be a very important problem this year. Upon further investigation by this department, it was found that matters were more serious than we had realized. In order to get at the root of the matter this department had several meetings and conferences with a committee of men who were appointed by the Cape Cod Cranberry Growers Association to co-operate with the State in determining upon ways and means of relief. The five men who represented the cranberry association were Mr. Seth C. C. Finney of Carver, chairman, Mr. Irving C. Hammond of Wareham, Mr. J. M. Bump of Carver, Mr. John W. Churchill of Plymouth, and Dr. Franklin F. Marsh of Wareham. Although there was much unfavorable weather, everybody went at the task without loss of time, and



was built by our own men. Dean Hugh P. Baker of the New York State College of Forestry complimented us by saying he has The State Forester's nursery at Amherst, on the farm of the Massachusetts Agricultural College. The lodge in the right-hand corner never seen a better nursery for its size.



it is believed that all parties concerned feel that the results have proven well worth while. The committee representing the cranberry interests is composed of wide-awake business men with whom it has been indeed a pleasure to work. Their fairness and insistence upon owners of bogs doing their proportionate financial share in meeting the aid from the town and State have given us wholesome satisfaction in the work.

The cranberry bogs fall mostly in the divisions of Mr. Holmes and Mr. Farley, and these two men report not only very excellent co-operation by bog owners but an inclination on the part of many to carry on the work about their bogs at their own expense. It is also apparent that a great amount of moth thinning work is being carried on throughout this same section by farmers and woodland owners. The hard woods are rapidly being taken out and white pine encouraged to come in. This practice is not only the best remedy against gypsy moths, but is the foundation step in the production of a forest crop of great intrinsic value. If the gypsy moth has driven us to recognize this principle alone, it is quite possible that twenty-five to fifty years hence we may look back upon our present calamity as a blessing in disguise.

The towns of Carver and Middleborough in particular are making great strides towards encouraging white pine, which goes well with cranberry growing and general farming, thus utilizing all kinds of land by adapting them to their special crops.

It is not our purpose to outline as yet just what are the best methods of handling the gypsy moths in protecting cranberry bogs, but with the experience gained this season, and by following the same methods in conjunction with the committee and growers, it is believed we shall have advanced far enough to venture to do so another year.

Both labor and arsenate of lead are expensive at the present time, and it is feared that these conditions may continue the coming season, therefore the estimates that have been made will hold good this season.

FORESTRY INSURANCE.

This question is being studied, and it is believed that within the next year or so a practical solution of the matter may be outlined and inaugurated. Mr. W. R. Brown of Berlin, N. H., a practical lumberman and forester, has given the matter much attention, and it is believed we can work out a practical solution of the subject through a mutual forest insurance plan that will satisfy our people. This is the next step in forestry needing adjustment.

EXTRACT ON FORESTRY FROM THE ANNUAL ADDRESS OF MASTER OF THE STATE GRANGE.

The State Forester wishes to acknowledge with a great deal of pleasure the complimentary way in which State Master Edward E. Chapman referred to our work in his annual address to the State Grange on December 12. When one realizes that he represents 40,000 grange members who are interested in rural matters, the compliment seems all the greater. The following is the quotation from his address:—

I should feel that my report was incomplete without some reference to the important subject of forestry. Probably no effort on the part of the State has been received with more satisfaction and enthusiasm than the development of a definite forestry policy. I am glad to express the conviction that a majority of our citizens, and especially all Grangers, have come to recognize that fact that no field of public endeavor holds greater possibilities designed to increase the wealth of the State and the enjoyment of our citizens than the reclamation of the wild and waste lands by planting them to commercial trees. Every Granger must view with satisfaction the splendid development made in every branch of the State forest service during the past few years. To reach this point of satisfactory development has required a vast amount of hard, unselfish work on the part of the officials of the State Department of Forestry and fairly entitles them to the cordial support of all who hope to see Massachusetts one of the leading States of the Union in the conservation and management of our natural resources.

The stability of forest operations depends almost wholly upon protection which must be given against the various dangers which threaten the forests, such as fire, insect depredations and other hostile agencies. To meet the first of these dangers, there has been established what may be considered one of the most thoroughly equipped forest-fire protective sys-

tems in the United States. This system as at present constituted is made up, first, of the forest warden and his deputies in each city and town, who have sole control of the prevention and extinguishment in their respective municipalities. At present there are nearly 2,000 such wardens and deputies, most of whom are thoroughly interested in their work, which cannot fail to make a most effective organization. I am informed that through the well-directed efforts of the Forestry Department many of our towns are now well equipped with suitable apparatus for fighting forest fires. Perhaps the most valuable feature of the system is the establishment of the lookout stations, thirty of which are located at suitable points in the State and have proved extremely valuable as a means of reducing the annual damage caused by forest fires. Therefore we may reasonably conclude that, with adequate fire protection assured, taxes placed at a minimum, and assistance in management guaranteed by the Forestry Department at a nominal cost, private individuals may practice forestry on their nonagricultural lands with the consciousness that they are making a reasonably safe investment.

The reforestation law, so called, passed by the General Court of 1908, has proved to be of inestimable value and has thoroughly justified the wisdom of its makers. Under this law the private owner who wishes to reforest his land, but cannot at the time afford the expense, may turn it over to the State Forester who will plant it, and under this law the owner is given ten years in which to repay the Commonwealth for the cost of planting. If at the end of that period the owner does not wish to redeem it, it remains the property of the Commonwealth. The great value of this law from a forestry standpoint is made apparent from the fact that many people will take advantage of its provisions who would otherwise refrain from planting their land and financing the work themselves. It constitutes a direct aid as well as an encouragement to private reforestation. Inasmuch as nine-tenths of the forest land will in all human probability remain in private hands, it must be obvious that such encouragement and aid are most important.

Three years ago, by act of the General Court, a commission was appointed for the purpose of acquiring wild and waste lands to be converted into State forests. Since its establishment this commission has acquired three reservations, the aggregate area of which is about 10,000 acres. Because of the acquisition of these lands for State forests, it is the contention of some people that the reforestation act which I alluded to above has been in existence sufficiently long to have fulfilled its mission as a object lesson in planting management, an opinion which, in my judgment, is erroneous, for in determining the question one should consider that while the State Forester, working under the reforestation act, has established 130 plantations, they are located in only 52 towns. Inasmuch as there are 352 towns in the State, this leaves 300 towns without such object lessons; so that until the plantations are more widespread, it would seem to be unwise to discontinue giving to landowners the encouragement which

this law now affords. I feel that such an expression of opinion on this matter as might be voiced in some resolution adopted by the State Grange would serve to stimulate and encourage the forestry movement in our State.

Resolved, That the members of the Massachusetts State Grange view with gratification the splendid advancement made by our State Forester in the development of a definite and comprehensive forest policy. It is further

Resolved, That we believe it to be in the interest of all the people of this Commonwealth to retain and continue the policy contained in the so-called reforestation act, chapter 478, Acts of 1908, and that we deprecate and oppose any attempt to abandon or materially change said policy.

PROPOSED OFFICE OF TOWN OR CITY FORESTER.

It is believed that the time has come when there should be one man in each town and a similar official in each city where the charter does not already provide for it, who should be appointed by the selectmen in towns and the officials of the government in cities, subject to the approval of the State Forester, whose duty will be to exercise the authority now vested in the offices of moth superintendent and tree warden.

The recommendation is that the new official be designated as town or city forester as the case may be. The sole purpose of this recommendation is to unify and standardize the work and thereby be able to get better results.

In order to ascertain just how the selectmen would feel on this subject the following letter was sent them.

Dear Sir: — During the past few years the offices of local moth superintendent and tree warden have been the subject of discussion by many people interested in general forestry and the protection of our shade trees; and the question has arisen whether or not better results could be obtained if the two positions should be combined, the office to be called town forester, to be appointed by the selectmen, subject to the approval of the State Forester. This would be in accordance with the present manner of appointing the local moth superintendent and the forest warden.

No one has appreciated more than I the splendid interest which has been manifested by most of our cities and towns in all that pertains to forestry and insect suppression work. Yet I firmly believe that if the responsibility for the proper management of the trees in each municipality were imposed upon one competent person selected in the manner suggested above, it would remove all possibility of conflict of authority such as now exists, and put the whole problem of tree protection on a much firmer and more practical basis.

As State Forester I am frankly stating my personal views on this question, based upon several years' experience in observing the operation of the present laws. In entertaining this opinion I am not moved by any desire for further power or authority; neither do I wish to shirk any responsibility which would benefit the work in which I am engaged for the people of the Commonwealth.

Personally convinced of the wisdom of such a change, I desire to ascertain as far as possible whether or not the suggested change in the law would meet with the approval of the selectmen throughout the State, and if so whether they would be willing to give it their support.

Very truly yours, F. W. RANE, State Forester.

In response to this letter the department has 208 acknowledgments signed in most cases by the whole board, and of this number only 21 towns are opposed while 187 are favorable to such a change.

The same matter was presented before the annual meeting of the Massachusetts State Board of Agriculture on December 5, and after a thorough discussion they passed the following resolve:—

Resolved, That it is the opinion of the State Board of Agriculture that the office of tree warden should be made an appointive office; the appointment to be made by the board of selectmen in the same manner and under the same regulations as the appointment of moth superintendent and forest wardens in cities and towns.

The subject was taken up by the Massachusetts Tree Wardens and Foresters Association at their annual meeting last winter, and it was voted that a committee of six members, three from this association and three from the Massachusetts Forestry Association, consider the matter and report upon the same.

At a special meeting of the Massachusetts Tree Wardens and Foresters Association, held at Worcester on December 13, at which time the subject was reported upon, the following vote was adopted:—

Voted, That it was the sense of the meeting that we adopt legislation similar to Senate Bill No. 308 as presented to the General Court in the year 1916, which was as follows:—

An Act to provide for the Appointment of Tree Wardens in Cities and Towns.

Be it enacted, etc., as follows:

Section 1. The mayor and aldermen in cities and selectmen in towns shall annually in the month of January, subject to the approval of the state forester, appoint a tree warden to serve for the term of one year, or until the appointment of a successor. The tree warden, in addition to exercising the powers and duties conferred by chapter one hundred and forty-five of the general acts of the year nineteen hundred and fifteen, shall serve as the local moth superintendent and shall exercise all the powers and duties conferred upon such superintendents by chapter six hundred of the acts of the year nineteen hundred and thirteen and amendments thereof.

Section 2. So much of section three hundred and thirty-four of chapter eleven of the Revised Laws and amendments thereof as provides for the election of tree wardens in town meetings is hereby repealed.

Section 3. This act shall take effect on the first day of January in the year nineteen hundred and seventeen.

The Massachusetts State Grange also discussed the same subject in public session at their annual meeting in Tremont Temple, Boston, on December 14, at which time there were in attendance representative farmers from over the whole State, and the following resolve was passed:—

Resolved, That it is the opinion of the Massachusetts State Grange, that it is for the best interests of cities and towns, and of the work carried on under the departments of tree warden and moth superintendent, that the office of tree warden and moth superintendent be made an appointive office, the appointment to be made under the same regulations as the appointment of moth superintendents.

The above citations are presented simply to show that the recommendation is favored not only by this department but by our Massachusetts people generally.

The benefits to be derived from such an office could be discussed at length, but they are so obvious that it seems unnecessary to do so.

AUTO-TRUCK SPRAYERS.

With the great amount of roadside spraying necessary, the policy that has resulted in aiding many of our towns with relatively small liabilities was the so-called traveling sprayer system. This was to lay out definite routes and then make each sprayer serve a number of towns that otherwise would be unable to have the services of such a sprayer. This department besides furnishing the sprayer, manned it with

a competent engineer, horses and driver, and foreman, while the towns, through their local moth superintendent, furnished the extra labor and general co-operation necessary.

This practice has worked remarkably well and given universal success, but a study of conditions and experience are valuable teachers; and we are convinced that a great saving in time and money can be made by the substitution of traveling auto-truck sprayers in the place of horse-drawn ones.

We have had one such sprayer, built by this department in 1911, which has been in constant use each year, and its value on the North Shore, particularly on roadside work, has been well recognized. This experiment by this department was the beginning of revolutionizing the whole spraying question. Since that time, several such sprayers have been built, and with the advent of improved auto trucks, the time is ripe for their further use.

The United States government, Bureau of Entomology, built an auto-truck sprayer last year for its moth work that contains many improvements, and the results therefrom are a guarantee as to its value. This year they have already let contracts for three more such sprayers with further improvements.

This department has gone into the subject carefully and has decided to purchase three such spraying outfits, which will certainly be a big factor in accomplishing results. These outfits will take care of a large territory and enable us to cover quickly what it now takes many horse-drawn sprayers to cover. The present horse-drawn equipments can be used for aiding those towns needing such or additional equipment.

An auto truck can be operated by the engineer, saving thereby the expense of a teamster and the quickness with which an auto truck can go for water and return, as compared with a horse-drawn equipment, is a very important item.

While the first expense is much greater, the fact that these trucks can be used at other seasons of the year for many purposes as auxiliaries, for forest-fire fighting, collecting sprayers for overhauling, planting and care of trees on street highways, etc., readily shows that their acquisition will be very essential in the success of our State forestry work.

EXHIBITIONS.

A slightly different method was employed this year in bringing before the public the work of the department through the medium of exhibitions. The underlying motive in so systematizing this branch of forestry publicity was to give the largest possible amount of information to the greatest number of people. The county fairs seemed to offer the best opportunity for the teaching of general forestry methods, and exhibitions were installed at each of the following fairs: Marshfield, Oxford, Worcester, Fitchburg, Walpole, Reading, North Easton and Springfield (National Dairy Show).

During the week of December 11 to 16 an exhibition was given in Tremont Temple, on the occasion of the meeting of the State Grange.

Each exhibition was conducted along lines previously worked out, and included gypsy-moth work, forest-fire prevention, reforestation, forest improvement thinnings and general forestry. The electrically illuminated transparencies showing these different branches of forestry work, which were used at the national exhibition at San Francisco last year, proved of the greatest advantage from the educational point of view. At all of the outdoor gatherings the latest models of forest-fire motor truck and observation tower were placed on exhibition.

A VISIT TO THE UNITED STATES FOREST PRODUCTS LABORATORY AT MADISON, WIS.

After having had a conference with the United States Forester, Mr. H. S. Graves, on the question of utilization, particularly with reference to using the hardwoods in our moth-infested woodlands in Plymouth County, the State Forester made a trip to Madison, Wis., to consult with experts on the subject. Through the good offices of Forester Graves, Dr. Howard Weiss, the director of the United States Forest Products Laboratory, kindly offered the writer every possible courtesy, and the few days spent there proved of inestimable value. The amount of research that is being undertaken there, much of which has far-reaching value, is stupendous.

To a forester, the many uses for all kinds of woods to which these scientists are pointing the way, as well as the present and future industries, are extremely interesting. leads one to predict the time, at no great distance, when forests and trees in general will cease to be used for lumber and fuel, but will have innumerable other uses of far greater value. The great numbers of manufactured products that are made from wood fiber and wood pulp on display at the laboratory brought together from all parts of the country are certainly worth seeing. Everything from silk stockings and neckties to carpets and substitute wicker furniture are on exhibition. I was interested also in learning that New England manufacturers are among the leaders in these industries. The director told me of one firm alone that is manufacturing 20 tons of wrapping twine a day, all of which comes from wood pulp.

What is true of wood fiber products is equally true of wood chemical products. Besides charcoal and tar, acetate of lime and wood alcohol are some of the more important products obtained.

To secure information more particularly regarding the wood chemical products was the purpose of my visit. A very comprehensive knowledge of the whole process was gained, and this, together with the information we had already ascertained through correspondence with such firms as the Du Pont Powder Company, and a visit by my assistant, Mr. Paul D. Kneeland, to plants in New York and Pennsylvania, has given us much information which we trust may sometime prove valuable.

Moth-thinning Work.

Report of Progress during the Past Year.

The principle of moth thinnings, the removal of mothfavored trees as a means of controlling the gypsy moth, has found such general adoption that its propaganda and practice are no longer confined to one branch of the department. Many who ridiculed it at first are now among the leaders in advocating moth thinnings as the chief means of control for woodland infestations. No one branch of the department is responsible for the results obtained, but all have worked together. Moth thinnings have passed the test of experience and are now as much a matter of routine in most places as is spraying or creosoting. In newly infested districts considerable work remains to be done to demonstrate to owners the value of these thinnings. The main efforts of the department are now directed towards seeing that they are properly carried out and in aiding in the disposal of their product.

Co-operative Work.

The policy of direct aid to private owners in carrying out these moth thinnings is meeting with sufficient success to justify its continuance. The department co-operates with private owners by managing these operations and selling the product, while the owners furnish the capital necessary for carrying out the work properly. In this way the owners have the advantage of expert management of their forests without charge. The State is well repaid, not only by the control of the gypsy moths at slight expense to itself in the area covered by the operation, but by the fact, even more important, that the land, privately owned, will in the future be managed along forestry lines, probably just as much as if the land belonged to the State itself. It will never be possible in this country for the State to own as large a proportion of the forest lands as it does in many European countries. It seems to us that by this policy of aiding and co-operating with private land owners, the State may be able in the end to have a large proportion of the forest lands handled as conservatively as if it owned them itself. For this reason, the department is now branching out to aid not only owners of moth-infested woodland, but all who wish to practice forestry on their land. This will be discussed more fully later on.

The following co-operative operations have been carried on during the past year. Some of these have been listed in previous reports. If so, work has been continued on them into the past year.

CO-OPERATIVE OPERATIONS.

NAME OF OWNER.	Location.	Area (Acres).	Character of Operation.
G. M. Angier,	Marion,	15	Cordwood.
A. M. Davenport,	. Wellesley,	11	Sawmill.
Arthur D. Delano,	. Rochester,	25	Cordwood.
W. R. Heady,	Blandford,	2	Alder wood.
C. W. Hubbard,	. Weston,	150	Sawmill, planting, spraying.
F. H. Johnson,	Andover,	35	Sawmill.
C. H. Jones,	Weston,	60	Cordwood, logs.
Karlstein,	Dedham,	10	Brush, cordwood.
H. A. Lamb,	Milton,	20	Sawmill, brush, etc.
New Bedford Water Works,	Rochester,	200	Sawmill.
L. V. Niles,	Wellesley,	20	Cordwood, logs.
Horace Packard,	Stoughton,	15	Gray birch, cordwood.
Wm. E. Putnam,	Danvers,	40	Logs, wood, brush.
M. E. Reed,	Milton,	14	Sawmill.
A. G. Rotch,	Lakeville,	200	Sawmill.
J. J. E. Rothery,	Sandwich,	30	Cordwood, charcoal.
Jas. S. Russell,	Milton,	150	Sawmill.
Ellery Sedgwick,	Beverly,	50	Cordwood, brush.
Bartlett heirs,	Needham,	140	Sawmill.
Nathaniel Stevens,	North Andover, .	100	Planting, brush.
Wheaton College,	Norton,	50	Sawmill.

A total of 1,248 acres was covered in these operations. Over 2,300,000 feet of lumber and more than 6,000 cords of wood were cut, and over 100,000 trees planted. The total capital spent by private owners on these operations during the past year was about \$60,000. The receipts to owners for lumber and wood which was sold for them this past year exceeded \$75,000. Some of this was for material cut in previous years.

Examinations.

During the past year 27 moth examinations, which covered 1,981 acres, were made. These were in 20 different towns, and 14 written reports were submitted. Besides this a number of informal examinations were made on which no records were kept. A number of examinations were made by the moth-

thinning staff, which were recorded as forestry examinations and are so recorded in another section of this report. Seven different gatherings were addressed during the year on moth thinnings, and considerable publicity work was obtained through newspaper articles.

Better Utilization of Forest Products.

The farm improvement organizations have been able to interest the farmers in more scientific farming by showing them better markets for their products and better ways of selling. State and government agencies are giving the farmers actual and tangible aid along these lines, which is meaning not only dollars and cents to the recipients, but better farms and farming for the future. It is on exactly the same principle that this department is attempting to aid forest owners in the utilization of their forest crops. If the owners of forest land become more interested in the disposal of their crop, they will show more interest in raising and perpetuating it. The lumberman who merely buys stumpage and has no interest or inducement to keep the land on which this stumpage grows perpetually productive, must give way to the landowner who will think of the future as well as the present productivity of his land if forestry is ever to become anything more than an idea.

The field in forest utilization is so large that we are able to devote ourselves only to specific problems as they arise. A certain amount of general investigation is being done to find out and index the chief markets for forest products in the State. However, that field has been quite well covered in the past. Each locality and even each woodlot presents its own problems which cannot be worked out from generalities. We have been pleased to aid in the solution of a number of such problems for forest owners during the past year. The two principal problems which now confront us, and to which we have devoted our main energies, are the utilization of oak and of chestnut.

The importance of finding good markets for oak is due to the fact that oak is the favored food of the gypsy and brown-tail moths. The proportion of oak in the woodland of the eastern and southern parts of the State must be greatly reduced before

the moths can be successfully checked. The profitable sale of this oak, when it is removed, is therefore a vital problem. Oak which is large enough to be cut into lumber or ties can be disposed of profitably. In certain sections this was doubted until through our co-operative operations it was successfully demonstrated to be true. However, the bulk of the oak in the moth-infested region is only large enough for cordwood. The disposal of large quantities of oak cordwood is a necessity both for moth control and to save the owners an enormous loss due to moth killing. The local markets will not consume more than a certain amount, - not as much as will have to be cut within the next few years, especially down Cape Cod way. Oak wood does not sell very well in the Boston market, where cordwood from the northern beech, birch and maple forests is in demand. The only possible way seems to be in using it in chemical distillation or for charcoal, so these two subjects have been very thoroughly investigated.

Wood Distillation.

Last winter several chemical distillate plants in Pennsylvania were visited and the whole subject thoroughly gone over. Then some of the wood cut in Middleborough was sent to Madison, Wis., and tested there in the United States laboratory, to determine its suitability for chemical distillation. Finally, this summer a crew of forestry students covered Plymouth County, to map and determine the location and extent of the moth-infested oak woodlands. From the data thus obtained, it seems that the establishment of a medium sized up-to-date wood chemical plant in the southern part of the State is a feasible project if the capital necessary for such a plant can be obtained, and the landowners of the region can be interested sufficiently to assure the plant of an adequate supply of wood. A preliminary meeting was held in October at which six or seven prominent landowners or lumbermen of that region were present. They seemed interested and were willing to help raise capital. Nothing further has been done in the matter since. This has been due to the fact that it seemed unwise to push the matter further at present. The unprecedented shortage of labor and the present demand for and

high price of wood of all kinds, due to the coal and labor shortage, have been the cause. Whether anything further can or will be done remains to be seen. All the facts and data obtained are open to the inspection of any one who may be interested in this matter.

Charcoal.

Charcoal is one of the products of wood distillation, it being the residue after the other products are roasted out of the wood. Charcoal has been produced for ages in open sod kilns and the other products allowed to go to waste in the form of smoke. A little charcoal is still made in this way in southern Massachusetts. In order not to leave any stone unturned in the solution of the cordwood problem, it was decided to experiment in the making of charcoal in sod kilns, and by the data and experience thus gathered to determine whether or not this opened a market for at least some of the wood. Mr. J. J. E. Rothery of Boston, who owns a large tract of land in Sandwich and Mashpee, kindly consented to co-operate with us in such an experiment. His land is situated 6 or 7 miles from the railroad in a locality where there is a large amount of standing oak wood and a very small local market for it if cut. His land, like the surrounding areas, was seriously moth infested and some of the trees were already killed. Labor is scarce and expensive in that region, and by this combination of circumstances his wood would not be worth the cutting if sold through the usual channels. Therefore, by putting his wood into charcoal, it did not seem as if there would be much to lose, and there might be a gain. However, his condition is similar to that of owners of thousands of acres in that region. One hundred and twenty-five cords were cut for this experiment. which will be sufficient to make about 5,000 bushels of charcoal. The wood is being coaled at this writing, so we cannot yet give the results of the experiment. However, the price of charcoal is now high, and it seems from the present prospects that we shall be able to show a profit to the owner for his wood when the experiment is finished, - perhaps a substantial one. We should be glad to co-operate with other owners along similar lines.

Chestnut Utilization.

The chestnut blight is steadily advancing and no ray of hope in checking its ravages has yet appeared. In places its advance seems slower than anticipated, and in others more rapid. The blight is most prevalent in the western part of the State. All we can do is to aid the owners of chestnut growth in the sale and removal of their trees and in starting different species on their land. To make this aid more real and efficient we have inaugurated a policy of co-operative operations with owners of chestnut woodlands similar to what we are doing in mothinfested woodlands. However, to receive our aid the owner must agree to take measures which will insure a continued forest growth on the area (as planting, if necessary and advisable). This work is done under the general forestry law, which requires that the owner pay the expenses of travel and maintenance of the one who supervises the operation. However, it is not anticipated that this expense will be very onerous. By the experience in utilization gained in these operations we hope to be of great practical aid to other owners who do not need our aid in cutting their chestnut. Fortunately, at the present time the market for chestnut lumber of all kinds is good, and the prices are favorable. We are advising all owners to cut now when the market is high. After things settle down again, the continued ravages of the blight will force large quantities of chestnut on the market with, we fear, a disastrous effect on prices. We shall welcome calls from any owner of chestnut, and can furnish him with considerable assistance in the sale of his lumber or wood.

Alder Wood.

Another experiment in utilization, which has aroused considerable interest, was conducted this year. Just now, due to the war, there is a big demand for alder wood, which is used in the manufacture of black powder. There is considerable alder growing in Berkshire County and other parts of the State. It is generally considered a nuisance, since it springs up in the rich, moist soils, and makes an almost impenetrable thicket. Many farmers spend odd hours in cutting and burning

it up in brush heaps. Years ago in certain localities it was cut and hauled to a powder factory just over the Connecticut line. One mill near Concord, Mass., has always bought it, but most of their supply has come from New York State. In searching for a larger supply, they got in communication with this department, and we decided to try and see if an alder wood industry could be started profitably in this State. Judge W. R. Heady of Springfield, who has an estate in Blandford, consented to furnish the capital for this experiment, while this department managed it. One carload of alder was cut and shipped, and the figures showed that he obtained a profit above all expenses of about \$2 a cord. This is not very much, but is better than having the material go to waste or even be an expense as before.

The figures of the experiment are as follows: The powder mill paid \$12.50 a cord for the peeled alder wood delivered. The bark is used as a dye, and was sold at \$35 a ton on the cars. Fifteen cords of peeled wood should give about a ton of bark. The cutting and peeling of the wood is the chief expense, it being quite a task to remove the bark. operation it was done by hitting the stick with a wooden spud, which, in the spring and summer, causes the bark to come off quite readily. At other times the peeling is done with a draw shave. This was done at a rate of \$5 a cord by some ambitious but inexperienced college students, who furnished the only labor that could be obtained. They did not make very much money at it, but it seemed that experienced labor could at least make a day wage at that price, getting perhaps a half-cord a day. The collecting and bagging of the bark was a further expense. It all had to be hauled 8 miles over very poor roads to be loaded on the cars. freight cost about \$2 a cord, the railroads having granted a special commodity rate on our application. The conclusions drawn from the experiment are that if labor can be obtained under fairly favorable conditions, the cutting of alder wood should prove profitable. If farmers or their families could do it in spare hours, it should prove quite remunerative, although of course not any bonanza. We should be glad to give further and more specific information on the subject to any who are interested.

Publications in Preparation.

Two bulletins are in preparation, the data for which have been collected largely during the past year. It is hoped that they will be ready for publication within a few months. Both throw light upon moth-thinning problems. One is to be on the "Forests of Plymouth County." In character and scope it will be similar to the one just published on Worcester County. The work was undertaken at this time in preference to other counties of the State in order to aid in combating the moths in that section. We desired a more thorough knowledge of forest conditions and composition in order better to realize and foresee the moth infestation in the woodlands of the county. This work was especially useful in helping to ascertain the practicability of a chemical wood plant in that section. rough estimate obtained in making the field data for this bulletin, we were assured that there was a sufficient supply to keep such a plant busy. In the preparation of this bulletin special efforts have been made to study and describe all markets of and possible places for the sale of wood and lumber. The field data were obtained by a crew of forestry students, who made traverses of the towns in half-mile strips this past summer. They lived in tents which were moved from town to town as they proceeded and meals were provided by a cook, who had charge of the camp. In this way the work was done more rapidly and economically than had been possible previously where only one or two men mapped a town and boarded around at places perhaps inaccessible to their work.

The other bulletin is on "The Utilization of Oak," and will embody all the experience and accumulated data collected during the past four years. The purpose of this bulletin will be to bring a knowledge of the uses of oak to the ordinary forest owner, so that he may be able to see in a standing oak tree or forest what it may be most profitably and economically converted into when cut.

Labor Problem.

The main difficulty of woods work this fall and winter has been to find labor for carrying it on. We have aided a number of owners who wished to carry on forestry work on their places in finding such labor.

Program for the Coming Year.

The moth thinning and utilization work begins the year with plans for larger service to the forest owners of the State. With field agents resident in the southern and western parts of the State, we shall have the facilities for co-operating in forestry operations of any kind, which we have never had before. We shall be able to give substantial and prompt aid to all owners who desire to practice forestry on their lands, or who are suffering from the ravages of insect or fungus pests. Our aim will be to popularize forestry by practical means, by showing that in actual operations it pays.

PRIVATE CO-OPERATIVE FOREST EXAMINATION WORK.

We have made more examinations this year than ever before, with the exception of 1912. It is inevitable that a scare concerning the danger of some new tree insect or disease brings a number of landowners into this office asking for an examination of their woodlands to see whether their trees are infested with the new pest. In 1912 it was the swift invasion of the chestnut bark disease which aroused the sudden interest of the owners, and during the past year it was the publicity given the threatening invasion of the white pine blister rust which sent numerous letters, telephone calls, office visitors and examination applications to this office. It is not to be supposed that all the assistance given private landowners by this department is included in the accompanying table. Many examinations are made by the woodlot utilization branch of our department and also by our district moth superintendents, but as these men keep no special record of such examinations they are not listed.

In addition to the examination of private lands a few jobs of brush clearing and light thinning were supervised by the foresters of the general forestry branch of this department, as follows:—

								Acres.
Mr. Jas. H. Barnard, Norwell,								10
Mr. H. G. Pratt, Shirley, .								12
Brockton Poor Farm, .				,•				10
Mr. Geo. A. Parker, Halifax,								5
Mr. H. W. Smith, North Graft	ton	(two	op	eratio	ns),			150

The great bulk of this supervised operating work, however, is done by our woodlot operating division, whose work you will find described elsewhere in this report.

FOREST EXAMINATIONS MADE FROM 1904 TO 1916.

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•	1904 (Six Months).	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
Number of examinations,	14	36	47	37	65	09	48	54	106	54	28	45	98
Total area (acres),	2,000	6,545	9,357	8,713	15,842	15,862	6,495	8,202	8,0391/2	10,250	13,255	4,319	11,62034

1 Thirty of these examinations, approximating 2,290 acrcs, were for chestnut bark disease.

LIST OF FOREST EXAMINATIONS, 1916.

	1		
Name.	Town.	Area (Acres).	Problem.
Attleboro Trust Company, .	Attleboro,	4	Thinning.
Ames, T. W.,	Dedham,	12	Thinning and planting.
Armes, Elanor M.,	Deerfield,	65	Thinning.
Baker, Daniel W.,	Phillipston,	30	Thinning.
Barnard, J. H.,	Norwell,	10	Thinning and planting.
Beal, H. W.,	Shrewsbury,	20	Thinning and planting.
Bird, C. S.,	East Walpole, .	40	Thinning and planting.
Bullard, Wm. N.,	Lenox,	225	Thinning and blister rust.
Cheney, W. B.,	Brimfield,	50	Estimate, thinning and plant-
Craig, David,	Wellesley,	5	Thinning and blister rust.
Curtis, Miss R. E.,	Brighton,	-	Disease and thinning.
Cushman, Mrs. Mary E.,	Amherst,	3	Cutting.
Cushman, Mr.,	Hubbardston, .	25	Thinning.
Dana, A. P.,	Wellesley,	40	Thinning.
Danvers State Hospital,	Danvers,	500	Thinning, planting and gen-
Davenport, Alfred,	Boxford,	2	eral. Blister rust.
Davison, C. S.,	South Williamstown,	20	Cutting and estimate.
Denegre, Walter B.,	West Manchester, .	5	Blister rust.
Department of Public Works, .	Attleboro,	20	Thinning and planting.
Ellis, Geo. H.,	West Newton, .	900-1,000	Thinning and planting.
Ellis Memorial Camp,	Sharon,	250	Thinning and planting.
Endicott, Wm. C.,	Danvers,	200	Blister rust.
Felton, Frederick L.,	Bolton,	200	Chestnut blight.
Fogg, Horace,	Norwell,	25	Thinning.
Fulley, Mrs. Mary G.,	Deerfield,	30	Estimate and thinning.
Gillett, Louis B.,	Wilbraham,	35	Estimate and cutting.
Hobbs, W. D.,	Shrewsbury,	25	General and thinning.
Heady, Wallace R.,	Blandford,	30	Estimate of alder.
Harriman, C. S.,	North Wilmington,	60	Planting.
Harris, R. O.,	East Bridgewater, .	2	Thinning.
Higginson, H. L.,	West Manchester, .	65	General.
Howe, Mrs. N. L.,	East Boxford, .	1/4	Insect.
Jewett, C. H.,	Pepperell,	60	Thinning.
Johnson, R. E.,	Barre,	25	Taxation.
Kilbourne, Dr.,	Groton,	125	Estimate and thinning.
Kirkham, Edward,	Holliston,	100	Thinning.
Lane, Emory W.,	Waltham,	12	Planting.

LIST OF FOREST EXAMINATIONS, 1916 — Continued.

Name.	Town.		Area (Acres).	Problem.
Leominster, city of, Poor Farm,	Leominster, .		41	Thinning.
Lyman, S. B.,	Athol,	٠	45	Thinning.
Marshall, Lewis,	Walpole,		5	Thinning and planting.
Metcalf, Louisa A.,	Franklin, .		45	Estimate.
Metropolitan Water Board, .	Westborough,		340	Thinning and planting.
Millis, town of,	Millis,		100	Blister rust.
Overseers of the Poor,	Brockton, .		10	Planting.
Oveson, R. H.,	Southborough,		20	General.
Palmer, Bradley,	Ipswich,		10	Blister rust.
Parker, Geo. A.,	Halifax,		. 20	Thinning and planting.
Parker, Samuel T.,	Wakefield, .		1/2	Insect and fungus.
Pearson, Benjamin,	Byfield,		-	Weevil and blister rust.
Perkins, Harry S.,	East Boxford,		25	Thinning.
Perry, J. C., et al.,	Shelburne Falls,		_	Tree disease.
Pickman, Dudley L.,	Bedford, .		200	Blister rust.
Pitman, Benj. F.,	Marion,		5	Blister rust.
Powell, J. W.,	Quincy,		_	Thinning.
Pratt, H. J.,	Harvard, .		46	Thinning.
Prescott, C. W.,	Concord, .		10	Blister rust.
Proctor, F. L.,	Wellesley, .		40	Blister rust.
Putnam, Wm. E.,	Danvers, .		60	Thinning and planting.
Rolfe, W. A.,	Boxford, .		-	General and blister rust.
Saltonstall, R. M.,	Sherborn, .		125	Thinning.
Seagrave, Arthur,	Uxbridge, .		20	Thinning.
Sears, Philip,	Brookline, .		10	Thinning.
Sedgwick, Ellery,	Beverly,		165	Thinning.
Town Farm,	Sharon,	ı	5	Planting.
Skinner, Joseph A.,	South Hadley,		5	Planting.
Stiles, Wayne,	Huntington, .		40	Thinning and estimate.
Swampscott Park,	Swampscott, .		20	Planting.
Taft, Geo. S.,	Uxbridge, .		6	Thinning.
Tunxis Club,	Tolland,		6,000	Heavy thinning.
Vaughn, Aubrey W.,	Sturbridge, .		40	Chestnut blight, thinning and
Walpole High School,	Walpole,		150	planting. Thinning and planting.
Walpole, town of,	Walpole,		-	Thinning and planting.
Welschendorf, Geo. E.,	East Bridgewater,		40	Thinning, planting and blister
Ward, Maria J.	Norfolk,		10	rust. General and estimate.

LIST OF FOREST EXAMINATIONS, 1916 — Concluded.

Name.	Town.	Area (Acres).	Problem.
Watertown Arsenal,	Watertown,	2	Planting.
Westborough State Hospital, .	Westborough, .	-	Blister rust.
Wetherell, L. C.,	West Mansfield, .	50	Taxation.
Winsor, Robert,	Weston,	-	Chestnut bark disease.
Winsor, Robert,	Weston,	350	Chestnut bark disease.
Whitney, Byam,	Princeton,	60	Planting.
Elizabeth Peabody House, .	Sharon,	30	Thinning.
Fenno, Ed. N.,	Falmouth,	150	Thinning.
Wilson, Wm. P.,	Bourne,	-	Blister rust.
Brand, I.,	South Billerica, .	35	Thinning.
Schaff, Morris,	Southborough, .	80	Brushing and planting.
Clark, Miss Jennie,	Lowell,	20	Improvement thinning.
Total,		11,640	

Where areas are not given, the examination was of shade and ornamental trees.

REFORESTATION WORK.

The work of taking over and reforesting cut over woodlots and old pastures under the reforestation law has been held somewhat in check during the past two years by the fact that the new policy of purchasing large contiguous tracts under the title of State forests was just being inaugurated. It was thought best not to acquire land under two systems at one time until both at least were well established and recognized. The State forest system is now well established, and it can be seen that the State forests and plantations each fill different places in our work of reclaiming waste lands, and in fact the one complements the other. We, therefore, feel justified in taking up the reforestation work again as it has been carried on in the past.

We have purchased two small lots, one of 30 acres in Barnstable adjoining the Shoot Flying Hill tower, and another of 10 acres. The remaining lots were granted to us without cost and with the privilege of redemption on the part of the owner. The statistics of the new planting and auxiliary work done will be found in the following table. This does not include work done on State forests, which is described in another place.

New Work, 1916.

Num- ber.	NAME.	Town.		Area (Acres).	Planted (Acres),	Brushed (Acres).	Number of Trees set.
122	Simpkins,	Yarmouth,		40	40	40	40,000
129	Simpkins,	Yarmouth,		22	22	22	20,000
126	Smith,	Ashburnham,		32	32	32	32,000
127	Smith,	Ashburnham,		25	25	-	18,000
124	Hanson,	Marlborough,		95	45	35	45,000
130	Morgan,	Hubbardston,		95	70	-	22,000
125	Johnson, Mrs. Caroline,	Dana, .		11	11	-	9,000
132	Johnson, Adolph,	Dana, .	٠.	10	10	-	8,000
128	Herrick,	Lynnfield, .		7	7	7	7,000
	Totals,			337	262	136	201,000

In addition to the new planting we have cut brush and filled in where trees have died on older plantations, as listed in the second table.

Maintenance Work, 1916.

Num- ber.		То	WN.			Area (Acres).	Replanted (Trees).	Brushed (Acres).	Fire Line (Rods).
67	Buckland,					166	2,000	-	_
68	Buckland,					11	8,000	-	-
53	Hubbardston,					34	-	34	-
16	Westminster,					39	-	-	100
60	Kingston,				-	140		120	_
54	Wellfleet, .					8	7,000	8	-
27	Gardner, .					93	-	-	85
79	Gardner, .		14.7			87	-	-	36
63	Lancaster,					74	10,000	-	_
22	Hubbardston,		٠			10	-	-	70
26	Templeton,					60 .	-	_	50
46	Oakham, .					115	23,000	30	-
13	Spencer, .					5½	-	5½	140
	Totals,					842	50,000	198	481





The State Forester's nursery at Barnstable. This nursery supplies the stock for the whole Cape Cod section of the State. Three hundred seed beds.

NURSERY WORK.

Our nursery policy, which was more or less settled last year, has been more fully carried out this year. This policy is to maintain at Amherst and Barnstable nurseries in which to raise all our seedling stock and such transplants as there may be room for, and to set in auxiliary transplant nurseries the excess supply of seedling stock. Our chief auxiliary nursery is at the State Farm in Bridgewater, where the labor is furnished by the inmates of the farm, and the only expense to us is the time of one foreman in managing the work. We are indebted to Captain Blackstone, the superintendent, and Mr. McRea, the farm manager, for their active interest and co-operation in this work. On the Otter River and the Myles Standish forests we have established small nurseries for the purpose of raising transplants to be set out on the reservations. These nurseries are easily cared for by the men employed on the forests. At the Norfolk State Hospital a small nursery was started, more for demonstration purposes than for practical use. We were able to reduce our nursery costs below that of 1915 in spite of the fact that a small motor truck has been added to our nursery equipment.

At the State Farm nursery all the white pine transplant stock on hand in the spring, amounting to 150,000 trees, was shipped out for field planting, and 700,000 Scotch pine seedlings were put in their place. In the fall 300,000 more Scotch pine seedlings were added to this number of transplants.

From the Amherst nursery we shipped 233,000 transplants for planting on our own lands, and 550,000 seedlings and 72,000 transplants were sent outside of the department. We transplanted about 1,000,000 two-year seedlings in the nursery and shipped out 200,000 seedlings for transplanting in auxiliary nurseries. Under the direction of Professor Clark at the Agricultural College some fertilization experiments were tried.

From the Barnstable nursery 56,000 transplants were shipped for department planting, and 16,000 for outside planting. Over 1,000,000 Scotch pine seedlings were sent to the State Farm nursery for transplanting there.

STOCK SHIPPED FOR PLANTING ON REFORESTATION LOTS AND STATE FORESTS, 1916.

	Nυ	RSER	Y.		Species		Class.	Number.
Amherst,					White pine,		3-year transplants, .	4,000
Amherst,					White pine,		4-year transplants, .	146,000
Amherst,					Red pine, .		4-year transplants, .	65,000
Amherst,					Spruce, .		4-year transplants, .	10,000
Amherst,				٠.	Ash,		2-year seedlings, .	3,000
Amherst,					Larch, .		3-year transplants,	5,350
Barnstable,					White pine,		4-year transplants, .	56,000
State Farm,					White pine,		4-year transplants, .	97,000
Total,								386,350

STOCK SHIPPED FOR TRANSPLANTING IN SPECIAL NURSERIES, 1916.

	Nυ	RSER	Y.		Specie	8.	Class.	Number.
Amherst,					White pine,		2-year seedlings, .	280,000
Barnstable,					Scotch pine,		2-year seedlings, .	1,000,000
Total,								1,280,000

Number shipped for planting on reforestation lots and State forests, 386,350; number shipped for transplanting in special nurseries, 1,280,000; total number, 1,666,350.

STOCK BOUGHT FROM OTHER NURSERIES, 1916.

Bought from —	Species.	Class.	Num- ber.	Shipped to —
Keene Forestry Company,	White pine, .	4-year transplants,	7,000	Ashburnham.
New England Forestry Company,	White pine, .	4-year transplants,	5,000	Winchendon.
New England Forestry Company,	Red pine, .	4-year transplants,	30,000	Winchendon.
American Forestry Company, .	Sugar maple,	2-year seedlings, .	1,000	Dana.
Total,			43,000	

STOCK SHIPPED OUTSIDE DEPARTMENT, 1916.

Consignee.	Species.	Class.	Num- ber.	Nursery.
Metropolitan Park Commission,	White pine, .	2-year seedlings, .	200,000	Amherst.
Metropolitan Water Board, .	White pine, .	2-year seedlings, .	150,000	Amherst.
Metropolitan Water Board, .	Scotch pine, .	2-year seedlings, .	100,000	Amherst.
Metropolitan Water Board, .	Red pine, .	2-year seedlings, .	100,000	Amherst.
Boston State Hospital,	White pine, .	4-year transplants,	100	Amherst.
Boston State Hospital,	Norway spruce,	4-year transplants,	100	Amherst.
Boston State Hospital,	Larch,	4-year transplants,	100	Amherst.
Moth department,	White pine, .	4-year transplants,	21,000	Amherst.
Moth department,	Red pine, .	4-year transplants,	10,100	Amherst.
Moth department,	Spruce,	4-year transplants,	8,300	Amherst.
Grafton State Hospital,	White pine, .	4-year transplants,	5,000	Amherst.
T. W. Ames,	White pine, .	4-year transplants,	500	Amherst.
Hudson Water Board,	White pine, .	4-year transplants,	10,000	Amherst.
Danvers State Hospital,	Red pine, .	4-year transplants,	2,000	Amherst.
F. C. Haskins,	White pine, .	4-year transplants,	4,000	Amherst.
F. C. Haskins,	Red pine, .	4-year transplants,	500	Amherst.
Harry W. Smith,	Red pine, .	4-year transplants,	5,000	Amherst.
Harry W. Smith,	Spruce,	4-year transplants,	5,000	Amherst.
City of Salem,	White pine, .	4-year transplants,	150	Amherst.
City of Marlborough,	White pine, .	4-year transplants,	1,000	Amherst.
Attleboro Board of Public Works,	Norway spruce,	4-year transplants,	1,000	Barnstable.
North Shore Improvement So-	Norway spruce,	4-year transplants,	2,000	Barnstable.
ciety. Watertown Arsenal,	Spruce,	5-year transplants,	300	Barnstable.
Brockton Overseers of the Poor,	White pine, .	4-year transplants,	9,500	Barnstable.
Brockton Overseers of the Poor,	Spruce,	4-year transplants,	2,000	Barnstable.
Brockton Overseers of the Poor,	White pine, .	4-year transplants,	1,000	Barnstable.
Attleboro Public Works,	White pine, .	4-year transplants,	7,000	State Farm.
North Shore Improvement So-	White pine, .	4-year transplants,	8,000	State Farm.
ciety. Simpson estate,	White pine, .	4-year transplants,	10,000	State Farm.
North Shore Improvement So-	Spruce,	4-year transplants,	2,000	State Farm.
ciety. Attleboro Board of Public Works,	White pine, .	4-year transplants,	7,000	State Farm.
Simpson estate,	White pine, .	4-year transplants,	10,000	State Farm.
F. C. Haskins,	White pine, .	4-year transplants,	7,500	State Farm.
Total,			690,050	
	1			1

The inventory of our various nurseries shows that we have 640,000 four and five year transplants on hand for field planting next season. We have nearly 3,000,000 three-year transplants, but do not plan to use more than a few of this class in field planting, preferring to let them become four years old. We have approximately 2,000,000 two-year seedlings which next year must be transplanted, and 627 beds now one year old.

INVENTORY OF STOCK, STATE FOREST NURSERIES, 1916.

Barnstable.

Species.			5-Year Trans- plants.	4-Year Trans- plants.	3-Year Trans- plants.	3-Year Seedlings.	2-Year Seedlings (Beds).	1-Year Seedlings (Beds).
White pine, .			-	150,000	125,000	-	166	260
Red pine,			-	75,000	125,000	15,000	-	-
Austrian pine, .			-	20,000	10,000	35,000	-	-
Scotch pine, .			-	-	-	300,000	25	80
Spruce,			50,000	-	225,000	-	15	60
Douglas fir, .			-	-	60,000	-	-	-
Larch,			-	-	15,000	-	-	5
Arbor vitæ, .			-	-	25,000	-	-	-
Norway maple,			-	-	2,000	-	-	-
Totals, .			50,000	245,000	585,000	350,000	206	405
White pine,	•	٠	-	folk State - Farm, Br	50,000	-	-	-
Scotch pine, .	•		-	-	1,000,000	-	-	-
White pine, .			Otter	· River St	tate Fores	t	-	-
			Myles	Standish		rest.		
Scotch pine, .			-	-	40,000	-	-	-

INVENTORY OF STOCK, STATE FOREST NURSERIES, 1916 — Concluded.

Amherst.

Species Spec		 						
Red pine,	Species.		Trans-	Trans-	Trans-		Seedlings	Seedlings
Scotch pine, - - 6,000 76,000 - 19 - Spruce (Norway), - - 39,000 - - 18 9 Hemlock, - - 3,000 - - - - White ash, - - 45,000 - - - - Arbor vitæ, - - 4,500 - - - - Austrian pine, - - - - 3 - European larch, - - - - 30 -	White pine, .		-	217,000	1,000,000	_	63	195
Spruce (Norway), - - 39,000 - - - 18 9 Hemlock, - - 3,000 - - - - White ash, - - 45,000 - - - - Arbor vitæ, - - 4,500 - - - - Austrian pine, - - - - 3 - European larch, - - - - 30 -	Red pine,		-	30,000	35,000	-	17	18
Hemlock, 3,000	Scotch pine, .		-	6,000	76,000	_	19	-
White ash, 45,000 Arbor vitæ, 4,500	Spruce (Norway),		-	39,000	`-	-	18	9
Arbor vitæ, 4,500 Austrian pine, 3 - European larch, 30 -	Hemlock,		-	3,000	-	_	-	-
Austrian pine, 3 - European larch, 30 -	White ash, .		-	45,000	-	-	-	-
European larch, 30 -	Arbor vitæ, .		-	4,500	-	-	-	-
	Austrian pine, .		-	1 -	-	-	3	-
Totals, 344,500 1,111,000 - 1501 222	European larch,		-	-	_	-	30	-
	Totals, .		-	344,500	1,111,000	-	1501	222
Grand totals, 50,000 589,500 2,936,000 350,000 356 627	Grand totals,		50,000	589,500	2,936,000	350,000	356	627

¹ The 150 two-year seed beds contain approximately 868,500 trees.

STATE FOREST ADMINISTRATION.

By law the State Forester is charged with the administration of State forests acquired by the Forest Commission, but, as he has no appropriation for this purpose, the only money which we have been able to devote to this work has been about \$3,500, which has been taken in part from the nursery fund and in part from the general fund of the department, which otherwise could have been spent for salaries, traveling and general office expenses. To use this money on State forests we must necessarily curtail our other lines of work which should legitimately be carried out. The money spent by this department has been put on the Otter River forest. The State Forest Commission has from its own funds done considerable work on the Myles Standish forest in Plymouth, but, as their funds are intended for land purchase and contingent expenses, they do not feel justified in setting aside any considerable amount for strictly forestry work. On the Andover forest no work whatever has been done. It must be strongly urged therefore that an appropriation of \$20,000 be provided for the reforestation and administration of the State forests which have been and are about to be acquired.

Otter River Forest.

During the past winter and this fall approximately 70 acres have been brush cleared in preparation for planting. During the spring about 125,000 transplants were set on 200 acres as against 75 acres in 1915. The fire lines built in 1915 have been mowed and burned over, the sides of the main highways have been cleaned of brush, and some old woods roads have been opened up. A small transplant nursery for the purpose of raising stock for use on this forest has been established. Those owners who sold their lands to the State, reserving cutting rights, are making use of those rights this fall, and a serious problem is offered to us in the disposal of the slash which they leave. The Forest Commission has added to the forest by the purchase of one small interior holding of 6 acres. The head-quarters house was struck by lightning during the summer, but the damage was not large.

	Acc	OUNT		1	Labor.		Teaming.	Supplies
Fire lines and ro	ads,			.	\$326 7	5	-	-
Planting,					832 38	8	\$77 81	-
Brush clearing,				.	1,673 13	3	-	-
Nursery,				.	459 50	0	4 00	
Miscellaneous, .					281 50	0	-	\$34 00
Totals, .				.	\$3,573 20	6	\$81 81	\$34 00

Myles Standish Forest.

Nursery. — In May, 1916, approximately 35,000 two-year-old Scotch pine seedlings were set in beds on the reservation. These young plants have done well during the past season, proving that any number of young pines needed for future planting upon the reservation may be raised in a nursery upon the reservation itself if so desired.

There still remain a few spruce and larch in a formerly used nursery upon the reservation that should be planted during the coming planting season.

Plantations. — In May, 1916, approximately 1,500 large white pine plants about seven years of age were transferred from a

former nursery on the reservation and set out at the usual spacing of 6 by 6 feet. Approximately 300 red pine plants four years old were set at the same time. Although the white pines were much larger and older than plants usually set in plantations, about 99 per cent. of those set have lived.

Road Clearing. — During the past year about 16 to 18 miles of unused and nearly unused roads that had become choked up with brush and pitch pine were cleared. Many of these roads have been grubbed over, thereby making them usable for the quick transportation by teams or automobiles of fire equipment. The clearing of these roads has made nearly all parts of the reservation much more accessible.

Also, approximately 7 miles of the exterior boundary lines were cleared in the spring to a width of 15 feet. This boundary-line work should be continued when funds are available for the purpose.

A WESTERN MASSACHUSETTS FORESTRY OFFICE.

We have had the privilege of putting into operation this past year a plan which we have for some time had in view. We have placed a forester in Springfield for the purpose of handling the forest examinations, planting work and woodlot operations in that end of the State. The fire warden and gypsy moth divisions of this department both have several sectional superintendents, but all forestry work in the past has been handled directly from Boston headquarters. It has been impossible for us to give adequate attention to the large forestry needs of the western end of the State, and the private landowners desiring examinations of their property have been under the necessity of paying the traveling expenses of the forester from Boston, while now such expenses will only be counted from Springfield. This same saving applies to the work of the department.

The co-operation of the Hampden County Improvement League has helped materially to make this plan possible. They have supplied our assistant with free office quarters and service in their rooms in Springfield. The young man chosen for this situation is Mr. C. R. Atwood, a graduate of the forest school of the University of Maine, who for more than a year past has been a field foreman in our woodlot operating service.

PUBLICATIONS.

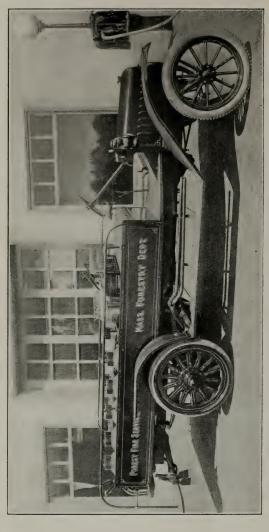
No new publications have been put out during the year, but the data for the extensive investigation of the forest conditions of Worcester County commenced in 1913 have been completed by the survey of six towns which had not been previously done and the condensing of the complete data into a bulletin which is now in the hands of the printer and which we expect to appear in a few weeks.

A fifth edition of our popular bulletin, "Forest Trees of Massachusetts," which has been out of print for nearly a year has come from the press and is ready for distribution.

FINANCIAL STATEMENT. Purchase and Planting of Forest Lands.

									\$10,000	00		
Check return	ed, I	. F.	Web	ber,					12	00		
Expenditu	res:-	_									\$10,012	00
Pay roll, .									\$8,810	85		
Travel, .									512			
Land, .									190	00		
Trees, .									12	75		
Freight, team									316	78		
Supplies and	equip	omen	t,						132	61		
Postage, .									2	81		
Sundries, .									27	45		
											10,005	51
Balance	retur	ned t	o tre	easur	y No	v. 3	0, 19	16,			\$6	49
							Exper					
Appropriation	n for	1916							PO1 000	00		
		1010	,					•	\$21,000	00		
Amount brou												
Amount brou Expenditur	ght f	orwa							28		\$21,028	69
Expenditu	ght f	orwa: -	rd fo	r ove	erdra	ıft,			28	69	\$21,02 8	69
Expenditur Pay roll, .	ght fes: —	orwa:	rd fo	or ove	erdra	ift,			28	69	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, .	ght fes:—	orwa:	rd fo	or ove	erdra				\$8,083	69 22 39	\$21,02 8	69
Expenditur Pay roll, . Travel, . Printing, .	ght fes:—	orwa:	rd fo	or ove	erdra				\$8,083 2,462	69 22 39 32	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, . Stationery an	ght f	orwa:	rd fo	or ove	erdra				\$8,083 2,462 385	69 22 39 32 36	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, . Stationery an Books, maps,	ght f res: - d pos phot	orwa	rd fo	etc.,	erdra	ift,			\$8,083 2,462 385 661	69 22 39 32 36 51	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, . Stationery an Books, maps, Supplies and	ght fres: —	orwa	rd fo	etc.,	erdra				\$8,083 2,462 385 661 · 281	69 22 39 32 36 51 82	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, . Stationery an Books, maps,	ght f res: — d pos phot equip	orwa	rd fo	etc.,	erdra				\$8,083 2,462 385 661 · 281 1,195	69 22 39 32 36 51 82	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, . Stationery an Books, maps, Supplies and Sundries, . Nursery:—	ght fres: —	orwa:	phs,	etc.,	erdra				\$8,083 2,462 385 661 · 281 1,195	69 22 39 32 36 51 82 47	\$21,028	69
Expenditur Pay roll, . Travel, . Printing, . Stationery an Books, maps, Supplies and Sundries, .	ght fres: —	orwa:	phs,	etc.,	erdra				\$8,083 2,462 385 661 281 1,195 216	69 22 39 32 36 51 82 47	\$21,028	69





A forest fire truck built and equipped for the State Forester's Department. A truck like this makes an ideal equipment for towns and cities having woodlands to look after. This truck was exhibited at various fairs this year. Costs and general information can be had by applying to the State Forester, State House, Boston.

Express, freigh	at, tea	ming,						\$340	72		
Supplies and e	quipn	nent,						147	30		
Sundries, .								578	87		
									-	\$21,022	99
Balance re	eturne	ed to ti	reasu	ry N	ov.	30, 1	916,			\$5	70

THE STATE FIRE WARDEN'S REPORT.

Mr. F. W. RANE, State Forester.

Sir:—In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year.

It is certainly very pleasing to the members of the forest fire service to report the decided reduction in fire losses, area burned and cost to extinguish fires since the department was established in the fall of 1911. The forest fire loss during the season of 1911 previous to the establishment of this department was \$537,729; the average acreage burned over per fire was 39.31; and the average damage per fire was \$226.24. These losses have been gradually reduced each year, our reports this year showing a loss of only \$44,765, with an acreage burned over per fire of 13.22 and the average damage per fire \$36.54, while the railroad fire loss has been reduced 96 per cent. from that of 1911.

With the exception of the drought during a portion of the month of May, the season has been very favorable. Our reports show a large number of fires during the above month, some of which caused considerable damage, notably the one at Loveville in the town of Holden, where several buildings were destroyed, but with very little damage to the forest area. The fire on Martha's Vineyard, where several thousand acres were burned over, caused considerable damage to the heath hen colony.

While the precipitation was much below normal during September, October and November, we did not experience any serious fires. It was suggested by certain interests outside this department that Governor McCall issue a proclamation declaring a close season for hunting, but conditions did not seem to warrant such an extreme measure. The Governor's secretary, however, issued the following warning the day previous to the opening of the season:—

The Governor feels that while the State Forester does not report that there is a special danger from fires on account of the drought, yet he deems it best to caution people who are in the woods during the hunting season to take great care against the starting or spreading of fires. The fire warden and his deputies and the game commissioners have been instructed to take careful observation and to report to the Governor, and if it should appear from their reports that there was danger of fire, His Excellency would feel called upon to suspend the open season until conditions improved.

While our reports show an increased number of fires during the entire hunting season, through the efforts of our district wardens and town forest wardens in extinguishing them promptly, very little damage was caused.

The same arrangement of fire districts has been maintained again this year. Several new towers have been erected and a number of the old towers have been repainted and supplied with additional equipment. The permit law as amended during the past session of the Legislature, requiring permits in every city and town, has given general satisfaction. Making its application universal throughout the State has helped very materially in the prosecution of violators, and the law has been more generally respected than in previous years.

The law relative to the disposal of slash and brush following wood or lumber operations has not accomplished the results that I anticipated when it was enacted two years ago. The trouble seems to be in its enforcement. Wardens are allowed no compensation for the work and in many cases local affairs enter in, so that it is really impossible in many towns to have proper enforcement of the law. It seems very necessary that the law be amended, giving this department the same authority that is vested in the town forest warden relative to the enforcement of it.

The establishment of a fire protective system for the protection of our recently purchased State forests has become necessary this year, and while this department has had a very limited amount of money that could be expended for this purpose, through an appropriation made by the land purchasing board, it was possible to brush out the survey lines and roads and distribute tool boxes equipped with forest fire-fighting apparatus and barrels filled with water throughout the Miles Standish Reservation in Carver and Plymouth. The roads and survey lines make excellent fire lines and means of getting additional fire-fighting equipment to any fire that may occur on the reservation. We should have on this reservation, as soon as funds are available, a small motor truck for carrying fire-fighting equipment, so that no time may be lost in getting to a fire.

In order that we might better demonstrate to the public the importance and necessity of having a motor truck for use at forest fires, we purchased a small truck and equipped it with three double forester pumps, six extinguishers, five one-man pumps, ten 5-gallon Marshfield cans for water, six shovels, six wire brooms, two axes and two grub hoes. In addition to the above, the truck was so arranged as to carry from ten to fifteen men. This makes an ideal equipment for small towns at a very reasonable cost. The truck was on exhibition at many of the fairs throughout the State this fall.

The towns of Pa'mer, Norton, Carlisle and Raynham purchased similar trucks this year, and several other towns are to make provision at their coming town meeting for the purchase of one. During the past year we have had one truck located at Westborough under the supervision of the district forest warden, with sufficient equipment for assisting small towns in fighting large fires. In Westfield our district forest warden is supplied with a trailer fully equipped and ready for any emergency call. This trailer can be attached to his auto, which carries from five to eight men, enabling him to get men and equipment to any dangerous fire in the district promptly.

FOREST WARDEN CONFERENCES.

During the months of February and March this department held a series of forest warden conferences throughout the State. These were held at Pittsfield, Greenfield, Worcester, Fitchburg, Springfield, Lawrence, Middleborough and Boston. The object of the meetings was that employees of the department might get in closer touch with the town forest wardens and selectmen and discuss with them the different methods of handling forest fires, the organizing of forest fire-fighting crews, the appointment of deputies located in the outlying portions of the various towns, and the importance of procuring equipment suitable for forest fire work.

These meetings were very instructive and were attended by nearly all the forest wardens throughout the State, each one being free to discuss matters pertaining to his locality. Short talks were given by members of this department on the general outline of the system and work. Mr. E. A. Ryder of the Boston & Maine Railroad and Mr. Charles B. Rood of the New York, New Haven & Hartford Railroad were in attendance, and explained fully what these railroads are endeavoring to do in order to lessen the damage and expense caused by railroad fires

The following is a list of observation stations and substations available for use at the present time, giving the number of fires reported from each during the past three years:—

FIRES REPORTED FROM OBSERVATION STATIONS.

	-		-	_					
	STA	ATION.					1914.	1915.	1916.
Harwich,						.	35	31	20
Barnstable, .						. 1	14	42	7
Falmouth, .							1	13	9
Bourne,						.	54	114	28
Kingston, .						- 1	-1	-1	-1
Plymouth, .		•		•	•	. 1	116 133	102 128	25
Middleborough,	•	•	•				33	128 453	61 222
Fall River, . Rehoboth	•	•	•	•	•	- 1	105	101	148
Hanson,	:	•		•	•	. 1	68	167	68
Hingham.	•	•	•	•	•	•	-1	-1	-1
Sharon,					:		203	280	42
Sudbury			·	·			-1	98	97
Wakefield.						. 1	174	263	40
Chelmsford, .							302	276	29
Georgetown, .						. 1	-1	213	26
Manchester, .							96	272	3
Mendon,							1	-1	65
Westborough, .						. 1	386	530	74
Wachusett, .							485	598	121
Petersham, .				•			-1 -1	-1 -1	-1 -1
Watatic, Warwick		•	•				94	36	38
Pelham,	•	•	•	•	•		47	59	38 15
Brimfield.	•		•				90	86	30
Charlton,	•	•	•		•		-1	-1	-1
Mount Tom.	•		•				135	72	-1
Shelburne Falls,							130	104	38
Savov							11	13	1
Ashfield,							2	24	-1
Chester,							-1	-1	2
Tolland,						. !	-1	-1	13
Mount Everett,							1	3	32
Lenox,							-1	-1	11
Williamstown, .							-1	56	8
Totals, .							3,013	4,180	1,273

¹ Not in operation.

A new 30-foot tower with stairs was erected on Monk's Hill in the town of Kingston. This covers the area formerly covered by the tower in Plymouth, and an additional amount of territory to the south and west. This station will be in operation during the entire fire season, while the Plymouth observation tower will be retained for use as a substation during severe droughts. The town of Kingston contributed very liberally towards the construct on of the telephone lines to this tower.

A new 40-foot tower with stairs was erected on Prospect Hill in Hingham. The towns of Cohasset, Hingham and Norwell contributed towards the purchase price of this tower, which covers an area of about 200,000 acres.

Owing to the discontinuance of the Blue Hill Observatory some two years ago, it became necessary to change the location of our Bluff Head tower to Moose Hill, in order that we might better protect the territory formerly protected by the Blue Hill tower. A new 40-foot tower with stairs was erected at Moose Hill, the towns of Foxborough, Sharon, Walpole, Westwood, Stoughton and Dover contributing towards the purchase price of this tower.

The tower formerly on Bluff Head was removed to Chester, where it will be erected next year on Holcomb's Hill. This is a 30-foot tower, and an extension of 20 feet will be added, giving it an elevation of 50 feet.

A 30-foot tower which has been in use for the past three years on Becket Mountain in the town of Becket has been taken down and removed to Lair's Hill in Tolland, where an extension of 20 feet was added. This change was made necessary by the erection last year of the tower on Lenox Mountain in the town of Lenox, which covered a large amount of territory formerly covered by the Becket Tower.

The old 30-foot tower formerly used at Westborough has been moved to Savoy Mountain in the town of Savoy, and a 20-foot extension has been added.

The above three towers are equipped with stairs and an 8-foot room at the top.

A new 40-foot tower with stairs was purchased and cement abutments were installed on Watatic Mountain in the town of Ashby, but, owing to our limited appropriation, we were unable to erect the tower this fall. This tower will be placed in operation early in the spring. The towns of Fitchburg, Townsend, Ashby, Ashburnham and Gardner contributed towards the purchase price of this tower.

It has been necessary to construct several miles of telephone lines in order to connect the above stations with the New England Telephone and Telegraph Company system. The construction work of both towers and telephone lines has been done entirely by our district men, inspectors and observers. Owing to the heavy rains during the months of June and July we were able to discontinue many of our observation stations and use the observers on this construction work. At times when the observers were not obliged to be on the lookout stations, I have had many of them devote their time to work on roads leading to the towers, so that it is now

possible for auto parties to drive direct to many of our observation stations. I hope that this work may be continued, with such assistance as we may be able to derive from local parties interested in the project, until all our stations are made easily accessible. The county road leading to our tower on Mount Everett is nearly completed, \$2,600 having been expended by the county of Berkshire this year in its construction. The towers are nearly all equipped with stairs so that they are accessible to any one, and our records show a total of nearly 30,000 visitors during the past year. We are always pleased to have the public visit them, not only for the pleasure they may derive from the beautiful scenery for miles around, but also from an educational standpoint. Our observers are very courteous and obliging and take pleasure in explaining our system and giving visitors a comprehensive idea of what the State is endeavoring to do to suppress the forest fire evil.

NEW Towers.

It is necessary that four new stations be established to cover the State entirely and complete the observation system. One station should be located on Martha's Vineyard, where we have had serious fires in the past with no protection from this department whatever. A new station should be located on Prospect Hill in Waltham, which would cover several towns that we are unable to cover from any other station, and where we are subject to a large number of fires each year. One should be located in the vicinity of North Brookfield, where we have a large amount of forested area without protection. While we have used Little Mugget Hill for the past three years as a substation, it seems necessary, if we are to accomplish the best results, that we should erect a small tower in order that we may accurately locate fires and also protect our equipment necessary for use in such work.

As our appropriation for forest fire-protection work is only sufficient for the maintenance of the present system, it will be necessary to ask the several towns that will be benefited by the above stations to raise a sufficient amount to cover the total cost of construction of the same. I feel quite confident that the amounts will be raised and the system completed this year.

The appropriation of \$5,000, which has been available each year for the past five years for reimbursing towns with a valuation of \$1,750,000 or less 50 per cent. on forest fire-fighting equipment purchased by them, was this year reduced to \$2,000 by the General Court. Owing to a large number of towns that have already taken up a large portion of their allotment, it seems fair to assume that this amount, if appropriated each year, will be sufficient to meet the future reimbursement bills. As shown by the following table the towns this year have been reimbursed to the amount of \$1,276.74, apportioned throughout the districts as follows: District No. 1, \$265.55; District No. 2, \$463.38; District No. 3, \$308; and District No. 4, \$238.82. All equipment purchased under this appropriation should be under the supervision of the town forest warden and is subject to inspection at all times by the State Fire Warden or his assistants.

Towns receiving Fire-equipment Reimbursement during Year 1916.

Ashby, .			\$ 95 30	North Reading,		\$1	57
Bellingham,			22 65	Norton,		241	25
Boxford, .			6 15	Otis,		4	25
Brimfield,			51 00	Plainfield, .		63	75
Brookfield,			127 00	Plainville, .		3	75
Colrain, .			43 75	Plympton, .		4	73
East Longmead	ow,		10 50	Salisbury, .		109	13
Erving, .			8 00	Shirley,		27	00
Florida, .			5 25	Southwick, .		20	57
Gosnold, .			55 40	Upton,		4	95
Harwich, .			16 00	West Brookfield,		99	75
Holbrook, .			66 00	Westminster, .		5	91
Lakeville, .			80 00	Windsor,		50	00
Lanesborough,			34 25				
Montgomery,			17 00	Total, .		\$1,276	74
New Braintree,			1 88				

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT.

Towns.		Axes.	Cans.	Extinguishers.	Hoes.	Lanterns	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Acushnet, .		1	10	18	-	_	_	4	1	_	-	_	2	\$250 00
Ashburnham,		-	-	8	-	-	-	-	-	-	-	-	_	25 00
Ashby,		-	-	48	-	-	-	2	2	-	6	-	1	250 00
Ashfield, .			-	33	-	-	-	-	-	-	-	-	_	99 00
Ashland, .		-	24	10	-	-	-	12	8	-	6	24		85 78
Auburn, .		-	-	83	-	-	-	-	-	-	-	-	-	249 00
Avon,		-	10	-	-	-	-	12	-	-	-	-	-	9 90
Becket,		-	14	16	-	'-	-	-	2	-	-	24	-	79 50
Bedford, .		1	14	24	-	-	-	-	-	-		-	1	249 67
Belchertown,		-	-	46	-	-	-	-	1	-	-	-	1	211 87
Bellingham, .		-	46	26	-	-	-	6	-	-	8	24	1	146 77
Berkley, .		-	36	24	-	-	-	-	-	-	-	-	-	162 00
Berlin,		2	10	38	-	-	1	12	-	3	12	-	1	241 45
Blandford, .		6	1	16	-	-	-	3	3	-	-	12	-	83 17
Bolton,		-	14	33	-	-	-	6	-	-	6	-	-	126 65
Boxborough,		1	12	30	-	-	2	-	-	3	4	3	1	182 80.
Boxford, .		-	24	16	-	-	-	-	-	-	-	12	-	51 75]
Boylston, .		-	-	66	-	-	-	24	-	-	28	-	-	243 61
Brimfield, .		-	10	48	-	-	-	-	-	-	-	-	-	170 25
Brookfield, .	•	-	66	25	-	-	-	-	3	-	24	24	-	127 00

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT AcT — Continued.

Towns.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Burlington,	_	-	20	-	-		-	-	-	_	_	1-	\$100 00
Carlisle,	2	15	19	-	2	_	6		1	10	12	1	250 00
Charlton,	-	-	77	1-1	-	-	4		-	16	-	-	250 00
Chatham,	2	15	11	-	2	3	4	-	3	5	-	1	152 98
Chester,		37	15	-	-		-	5	-	-	12	1	156 97
Chesterfield, .	-	-	25	-	II -		-	-	-	-	-	-	75 00
Colrain,	-	-	10	-	:	1	-	-	-	-	12	-	43 75
Cummington, .	-	-	19	-	1		-	1	-	-	-	-	102 12
Dana,	-	1	6	-	-	Н	-	-	1-	-	-	1	250 00
Dighton,	5	8	26	-	1	Ш	-	-	5	2	30	2	242 89
Douglas,	-	75	50	-	-		-	-	-	-	-	-	180 25
Dunstable,	2	25	10	-	1		4	-	3	6	6	1	110 69
East Longmeadow,	2	-	18	-	2	П	12	3	-	4	-	1	164 46
Edgartown,	2	5	10	-	2	3	4	-/	3	5	-	1	152 17
Enfield,	-	20	27	-			-	-	-		-	-	85 87
Erving,	-	-	27	6	-	Ы	-	-	-	18	-	-	94 52
Essex,	-	24	12	-	1-	Ы	-	-	-		-	-	37 80
Florida,	-	-	8	-	1		5	1	-	-	1-	-	31 25
Freetown,	1	24	20	1 -	Н		-	2	-	72	-	-	167 48
Georgetown, .	-	54	54	-			-	-1	16	12	-	-	196 48
Gill,	1	5	20	-			-	-1	-	-	-	-	65 00
Goshen,	1	12	58	-	-	1	-	-	-	-	-	-	244 05
Gosnold,	-	8	12	-	Н		-	-		-	-	-	55 40
Granby,	-	12	12	-	-	Ы	-	-		-	-	-	39 90
Granville,	-	10	22	-	-	Ы	-	-	-	-	-	2	203 50
Greenwich,	-	-	18	-	-	H	-	-	-	-	-	-	60 45
Groveland,	-	6	12	-	-		-	-	3	12	-	-	51 05
Hadley,	-	-	15	-	Ы	-	-	-,	-	-	-	-	75 00
Halifax,	-	12	64	-	1-1	-	12	-	-	18	-	1	241 91
Hampden,	-	-	24	-	-	-	24	-	6	6	6	-	89 06
Hancock,	-	9	1-	-	-	-	-	2	-	-	6	-	14 37
Hanson,	-	6	24	-	-	-	6	-	-	5	-	2	250 00
Harvard,	2	7	29	-	2	3	-	-	3	12	-	1	250 00
Harwich,	-	-	14	-	-	-	-	2	-	-	-	-	64 50
													124

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Continued.

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Towns.		Axes.	Сапз.	Extinguishers.	Ноев.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Holbrook, .		_	12	31	_	_		_	5	_	-	48	_	\$190 25
Holland, .		_	_	8	_	_		-	_	_	_	_	_	25 00
Hubbardston,		-	_	52	_	_	_	18	-	_	4	_	_	175 75
Kingston, .		-	-	24	-	_		-	-	_	I -	-	2	108 00
Lakeville, .		-	20	17	-	-		-	-		-	_	-	80 00
Lanesborough,		2	5	8	-	3	_	-	3	6	6	48	1	131 50
Leverett, .		2	20	16	8	2	4	-	2	4	8	-	2	160 17
Littleton, .		-	-	6	-	-	_	-	-	-	18	-	-	34 87
Leyden, .		16	10	10	17	-	_	-	_	4	8	-	-	31 55
Lunenburg, .		2	36	10	-	2	3	4	-	3	29	_	1	160 37
Lynnfield, .		-	35	20	-	-	-	-	10		-	6	2	249 95
Mashpee, .		6	24	25	-	-		12	-	-	12	-	1	157 12
Mendon, .		-	24	21	-	-	-	-	-		-	42	1	173 97
Merrimae, .		-	-	15	-	-		-	-	-	-	-	-	75 00
Middleton, .		-	12	16	6	2		-	L -I	-	5	-	-	157 69
Millis,		-		8	-	-		-	-	-	-	-	1	242 00
Monterey, .		-		-	-	-	-	-	3	-	-	12	-	15 25
Montgomery,		-	-	-	- 1	-	-	-	4	-	-	-	-	17 00
New Ashford,		-	-	-	-	-	-	-	4	-	-	4	-	18 25
New Braintree,		-	-	37	-	-	-	-	-	-	-	6	-	122 85
New Salem, .	u	-	55	20	-	-	-	-	-	-	-	-	-	100 50
Newbury, .		-	-	6	-	-	-	-	8	-	-	12	-	55 90
Norfolk, .	ı	-	-	18	-	-	-	-	-	-	-	-	-	99 00
North Reading,		-	-	38	-	-	-	-	-	-	-	12	1	250 00
Northborough,	ı	-	-	25	-	-	-	-	-	-	-	-	-	102 37
Norton, .		-	2	8	-	-	-	-	l -	-	12	12	1	241 25
Norwell, .		6	-	32	-	-	-	12	-	-	12	-	1	250 00
Oakham, .		-	12	31	15	1	1	6	-	3	3	-	1	226 97
Otis,		-	5	10	-	-	-	-	1	-	-	-	-	66 75
Paxton, .		3	-	28	12	-	-	-	13	-	6	-	-	105 87
Pelham, .		-	-	19	-	-	-	-	5	-	-	-	-	84 12
Pembroke, .		-	-	31	-	-	-	60	-	-	-	-	1	250 00
Petersham, .		2	10	36	-	2	3	4	-	3	5	-	1	248 05
Phillipston, .	٠	-	36	38	-	-	-	-	1	-	-	-	-	130 15

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT — Continued.

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Towns.		Ахев.	Cans.	Extinguishers.	Ноев.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Plainfield, .		-		30	-	-	-	-	-	-	-	-	-	\$146 25
Plainville, .		2	10	22		2	3	4	-	8	5	30	1	228 75
Plympton, .		-	-		-	-		-	12	-	18	-	-	25 66
Prescott, .		-	100	10	_	Н	-	1-	-	-	-	-	-	58 03
Princeton, .		-	32	80	-	-		-	I - i	-	-	- 1	-	249 20
Raynham, .		3	46	30	-	6	3	12	-	9	15	-	3	222 23
Rehoboth, .		1-1	10	48	-	-	-	-	-	-	-	1 -	1	250 00
Richmond, .		1 -	15	31	-	1-	-	4	1-	-	12	-	-	109 20
Rochester, .		1-	24	60	-	-	-	-	-	-	30	-	-	205 37
Royalston, .		3	20	32	30	2	2	12	-	-	42	-	2	250 00
Russell, .		1-	7	39	-	-	-	-	-	-	-	-	1	220 25
Rutland, .		-	12	18	-	-	-	6	H	-	-	-	1	250 00
Salisbury, .	ı	6		47	-	10	-	29	-	-	11	-	-	250 00
Sandwich, .		22	12	36	-	-	2	-	-	-	24	-	1	245 60
Shelburne, .		-	Ы	50	-		-	-	-	12	6	-	1	186 87
Shirley, .		-	48	42	-	-		1-		-	-	-	-	166 50
Shutesbury, .		-	28	25		-		23		-	6	-	-	101 25
Southampton,		-	-		-	-		II-I	1	-	-	12	-	8 75
Southwick, .		-	13	26	12	-		3	2		12	-	1	122 07
Sterling, .		-	-	25	-	-	II-I	-	-	В	-	18	1	241 12
Stow,		-	-	42	H	-	-	-	-		18	-	-	131 31
Sturbridge, .		-	11	35	-	-	-	-	-	-	-	-	-	116 45
Sudbury, .		-	-	40	-	-	-	-	-		-	-	-	250 00
Sutton,		-	50	50	24	-	-	-		32	24	-	-	188 46
Tewksbury, .		2	-	24	-	2	-	Ы			30	-	1	174 00
Tolland, .		-	-	II-I	-	-			4		-	4	-	18 26
Townsend, .	٠	-	-	46		-1	-		-	-	-		-	250 00
Tyngsborough,		-	220	20	-	-	-	-	54	12	24	36		250 00
Tyringham, .		2	10	30	-	2	-	10	-	2	3	-	1	144 80
Upton,		1	18	30	-	-	-	-	-	-	-	24	1	240 23
Wales,		2	-	40	12	2	2	2	-	-	6	-	1	241 99
Warwick, .		-	6	10	-	-	-	-	-	-	-	-	1	154 35
Washington, .		-	-	15	3	1	-	10	-	-	8	-	1	105 32
Wendell, .		-	38	27	-	2	-	12	-	-	18	-	1	163 24
			1		<u> </u>					<u> </u>	•	1		

Inventory of Equipment purchased under the Reimbursement $\mbox{\sc Act} -- \mbox{\sc Concluded}.$

Towns.	Axes.	Сапв.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
West Boylston, .	-	-	107	-	-	-	_	-	-	-	-	-	\$250 00
West Bridgewater,	-	-	20		-	-	-	-	-	-	-	1	250 00
West Brookfield, .	-	16	49	-		-	-	7	-	12	24	-	221 50
West Newbury, .	-	8	13	-	-	-	-	3	-	-	18	-	87 12
Westhampton, .	-	-	16	-	-		-	-	-	-	-	-	48 00
Westminster, .	-	77	48	24	-	-	24	1	-	36	12	-	250 00
Wilbraham,	-	- 27	32	-	-	-	23	-	12	6	-	-	118 38
Wilmington,	-	12	40	-	1	-	-	18	-	34	-		187 38
Windsor, : .	-	-	60	-	-	-	-	-	-	-	-	-	250 00
Worthington, .	2	15	10	-	-	3	-	-	-	5	-	1	86 01
Wrentham,	-	12	30	-	-	4	-	-	-	-	-	1	250 00
Totals,	111	1,895	3,545	154	55	42	452	183	144	816	587	63	\$20,095 41

Forest Fires of 1916.

	Mon	THÈ.		:	Number.	Acres.	Cost to extinguish.	Damage.
December,	191	15.			2	5 1	\$3 00	\$8 00
January,	191	L6.			15	46	52 00	10 00
February,					3	1	8 00	5 00
March,		٠.			10	68	25 00	5 00
April, .					233	1,382	1,368 00	3,287 00
May, .					567	12,332	4,619 00	38,755 00
June, .					28	65	207 00	153 00
July, .					8	6	37 00	45 00
August,			<i>'</i> .		5	3	29 00	-
September,					20	36	287 00	700 00
October,					170	1,102	1,160 00	1,208 00
November,					164	1,152	798 00	589 00
Totals,	٠.				1,225	16,198	\$8,593 00	\$44,765 00

Types of Land burned over (Acres).

						1914.	1915.	1916.
Timber,						3,001	3,817	1,435
Second growth,						9,016	6,749	755
Second growth, n	ot me	erchai	ntabl	e,		7,943	9,107	1,970
Brush,						11,645	14,681	9,990
Grass,					.	3,510	8,128	1,573
Not classified, .						4,860	5,907	475
Totals, .					.	38,975	48,389	16,198

Types of Classified Damages.

				1914.	1915.	1916.
Standing trees, .				\$50,697 00	\$73,782 00 ;	\$18,786 00
Lumber, logs, cordwo	od,		·	14,427 00	23,544 00	4,545 00
Buildings, bogs, etc.,				3,530 00	31,904_00	10,823 00
Bridges, fences, .				331 00	1,930 00	1,638 00
Not classified,				26,404 00	9,907 00	8,973 00
Totals,				\$95,389 00	\$141,073 00	\$44,765 00

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST SEVEN YEARS.

	Yz	IARS.	-	Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910, .				1,385	42,221	\$23,475	\$205,383.	30.46	\$148 29
1911, .				2,356	99,693	47,093	537,749	39.31	226 24
1912, .				1,851	22,072	20,219	80,834 6	11.92	43 67
1913, .				2,688	53,826	35,456	178,357	20.02	66 35
1914, .				3,181	38,975	48,750	95,389	12.25	29 98
1915, .				3,008	48,389	36,783	141,073	16.08	46 90
1916, .				1,225	16,198	8,593	44,765	13. 22	36 54

Precipitation in Inches from 1911 to 1916, inclusive.

Monte	s.	1911.	1912.	1913.	1914.	1915.	1916.	Normal.
December,		3.24	2.59	5.73	3.66	4.56	5. 69	4.56
January, .		3.07	3.87	3.21	4.30	7.38	1.84	4.12
February, .		3.20	2.24	3.77	3.52	4.30	5.37	3.97
March, .		3.27	5.26	5.32	4.20	.06	4.16	4.34
April, .		2.86	4.05	4.73	5.51	2.44	5.43	3.46
May,		.89	4.03	2.85	2.95	2.01	3.97	3.37
June,		4.76	.53	3.20	1.75 .	1.43	5.31	3.07
July,		4.55	4.16	2.00	3.38	9.52	7.55	3.65
August, .		6.70	3.85	3.30	4.59	4.83	2.81	3.70
September,		3.36	1.71	2.77	.45	.74	1.66	4.36
October, .		3.01	1.52	7.62	2.03	3.11	1.81	4.13
November,		5.71	3.45	2.70	3.06	2.47	1.88	3.96
Totals,		44.62	37. 26	47. 20	39.40	42.85	47.48	45.87

APPROPRIATION FOR PREVENTION OF FOREST FIRES.

Appropriation i	or 19	16,	•		•	•		• ;	\$28,000	00
Receipts: —										
For equipment	from	towns	and	cities,					974	30
For fire towers:										
Ashland,									100	00
Ashby, .									100	00
Cohasset,									200	00
Dover, .									50	00
Fitchburg,									100	00
Foxborough,									100	00
Gardner,									100	00
Hingham,									300	00
Lakeville,									150	00
Norwell,									125	00
Pittsfield,									42	00
Sharon, .									200	00
Stoughton,	. 0								150	00
Townsend,									100	00
Walpole,									100	00
Westwood.									50	00
Albert R. Ordw	av.									01
New England		one ar	d T	elegran	h Co	mpan	v.		1	90
Cochrane Chem									6	00
Federal departs	nent	(Weeks	s law	7).					1,252	
State Forest Co									31	
Gypsy and bro									94	
New Hampshir			-,			` .				94
Vermont.			Ċ		Ĭ.			Ţ,		90
Rhode Island.									9	19
New York.		:								60
Connecticut,		:		:		•	•	•		55
Commodulati,	•	•	•	•	•	•	•	•		00

\$32,358 59

1 77
3 71
7.00

Reimbursement for forest fire-fighting equipment to towns, . . . \$1,276-74

FEDERAL CO-OPERATION.

The co-operation carried on between this department and the Federal department has been very satisfactory. In addition to our regular Federal allotment of \$2,500, we were allowed an additional allotment of \$252, to be applied to the maintenance of Williamstown and Mount Everett observation stations. The regulations governing the Federal allotments make it necessary that the funds be expended in the payment of observers. We, therefore, transferred nine observers to the Federal pay roll for the entire season. I do not expect that this allotment will be decreased during the coming season, and there is a possibility of its being slightly increased.

Co-operative Forest-fire Conference.

Through an invitation extended by the State Forester to the Federal department, collaborators and State Fire Wardens of the northeastern and lake States and the State Fire Wardens from Pennsylvania and Rhode Island, the Fourth Annual Weeks Law Co-operative Forest Fire Conference was held in this city on January 20 and 21, 1916, at which the following program was carried out:—

JANUARY 20, MORNING SESSION.

Chairman, State Forester F. W. RANE. Secretary, State Fire Warden M. C. Hutchins.

PRACTICAL WORKING OF THE WEEKS LAW.

A discussion of the Weeks law policy and methods, the actual operation and effect of the requirements and how the administration of the act can be improved.

Mr. J. G. Peters, Chief of State Co-operation, Washington, D. C.

PUBLICITY AND EDUCATIONAL WORK.

A discussion of the ways and means of publicity and educational work, including the part which should be taken by the State, the Federal government and private owners.

> Mr. W. G. Howard of New York. Mr. Charles P. Wilber of New Jersey.

JANUARY 20, AFTERNOON SESSION.

Chairman, Mr. E. C. HIRST.

ORGANIZATION AND FINANCING OF FIRE-PROTECTION WORK.

- A discussion of the form and methods of organization and distribution of costs, in relation to all the agencies concerned in fire protection. The following subjects were included:—
- Organization of State fire-protective force, with duties of its members, inspection, patrol and lookout organization.

Mr. F. B. Moody of Wisconsin.

Mr. George H. Wirt of Pennsylvania.

Mr. F. E. MACE of Maine.

Relation of counties and townships (or towns) to the general protective work
of the State. Distribution of costs as between State, counties, private
owners and Federal government.

Mr. A. F. Hawes of Vermont.

Mr. W. O. FILLEY of Connecticut.

Mr. F. W. BESLEY of Maryland.

In the evening moving pictures showing equipment, methods of handling fires and destruction caused by fires were held in Tremont Temple. Films were shown by the Federal department, Maine forestry department, New York Conservation Commission, Wisconsin forestry department and the Massachusetts State Forester.

JANUARY 21, MORNING SESSION.

Chairman, Mr. W. O. FILLEY.

RAILROADS AND FIRE PREVENTION.

A discussion of the policy and methods pursued by railroad companies, the need of protective measures from the standpoint of the State and of the railroad itself, and the general relation of the railroads to the protective work and problems of the State.

Mr. F. W. RANE of Massachusetts.

Mr. W. T. Cox of Minnesota.

Mr. C. P. Wilber of New Jersey.

Mr. E. C. Hirst of New Hampshire.

FIRE-PROTECTIVE EQUIPMENT.

- A discussion of the more recent developments in equipment for patrol and fire suppression, the results accomplished with improved devices, etc.
- 1. Use of the bucket pump and water pack in fire fighting.

Mr. W. O. FILLEY of Connecticut.

2. Use of chemical extinguishers in fire fighting.

Mr. John P. Crowe of Massachusetts.

3. Map-making for lookout stations.

Mr. E. C. HIRST of New Hampshire.

4. Use of the aeroplane for fire patrol.

Mr. W. T. Cox of Minnesota.

Mr. F. B. Moody of Wisconsin.

RAILROAD FIRES.

Our railroad fire reports show 434 railroad fires as follows: Boston & Albany, 105, Boston & Maine, 81, New York, New Haven & Hartford, 212, Central Vermont, 36. These fires burned over an area of 2,257 acres, causing damage to the amount of \$12,858, with a cost for extinguishing of \$2,454.57.

Our reports of locomotive inspections made by the inspectors of this department show a total of 1,325 locomotives inspected as follows: Boston & Albany, 157, of which 27 per cent. were defective: Boston & Maine. 669, of which 24 per cent. were defective; New York, New Haven & Hartford, 499, of which 32 per cent. were found defective. A copy of each inspection report is placed on file with the Public Service Commission. Most of the defects found were of a minor character and were promptly repaired. We experience considerable trouble from fires caused by locomotives coming from outside the State, particularly those from the States of Connecticut and Rhode Island. This is undoubtedly due to the fact that no especial attention is paid to the spark-arresting devices in use, which need constant attention and care if they are to accomplish the purpose for which they were installed. The following reports from Mr. Morris O. B. Campbell, special attorney of the Boston & Albany, Mr. E. A. Ryder, commissioner of the Boston & Maine, and Mr. Chas. B. Rood, general claim agent of the New York, New Haven & Hartford, give a summary of the fire-prevention work accomplished by their respective roads during the past year.

Boston, Mass., Dec. 12, 1916.

Mr. M. C. HUTCHINS, State Fire Warden, State House, Boston, Mass.

DEAR SIR: — In reply to your letter of the 5th inst., requesting a brief report of our activities relative to the prevention and settlement of forest-fire losses, I beg to advise that for the year 1916 the number of forest fires reported has been the smallest for several years and that in no instance has there been a fire covering any area of considerable extent.

We are experimenting with a device installed in the front end and stacks of locomotives, which results in a smaller quantity of black smoke, decided reduction in the noise of the exhaust and in the quantity of sparks thrown from the stack. To date thirty-five locomotives have been equipped in this manner, and are running in the vicinity of the larger terminals and on some of the branches. It is felt that these devices have done effective work.

As in the past, we have enjoyed in most cases the hearty co-operation of the local forest wardens, and feel that with their assistance the forest-fire hazards so far as locomotives are concerned are being reduced to a minimum.

Yours very truly,

MORRIS O. B. CAMPBELL, Special Attorney.

Boston, Mass., Dec. 8, 1916.

Mr. M. C. HUTCHINS, State Fire Warden, Boston, Mass.

DEAR SIR: — In accordance with your request for information regarding fireprevention work done by this company during the past season, we beg to submit the following: —

The fact that there was a large amount of snow well into the spring, followed by frequent rains, accounts in a large measure for the comparatively small number of fires in the season; but the sudden disappearance of snow the last part of April and the very high winds during the month of May also account for the many fires that month. Since the month of May, however, there has been a very noticeable decrease in the number of fires. On our entire system of about 2,300 miles the number of fires average about 73 per month from Jan. 1, 1916, to Dec. 1, 1916, for which period we have paid fire claims amounting to \$22,411.33, and \$1,575.22 for outside help in fighting fires.

During the eleven months of 1916 just passed we have received reports of 808 fires on the system, compared with 2,330 for 1915, 2,313 for 1914, 3,189 for 1913 and 2.520 for 1912.

We have secured a number of permissions from owners of property contiguous to our lines to clean up and burn combustible material on their property; and we beg to assure you that we are not in any way lessening our efforts to bring about improved conditions in this respect.

We believe there is improvement in the co-operation of owners of property along our right of way; they are seeing the value of keeping their property clean and are more willing to give us permission to do it if they cannot. We hope, however, for an improvement in the matter of keeping brush the prescribed distance of 40 feet from our fence and a greater distance where possible, and, instead of putting it in windrows, to have it placed in piles with as much space as possible between them.

We take this opportunity to state we have received uniform assistance from all fire wardens and their deputies who have cheerfully and faithfully worked for the common good. We thank you and your district chiefs for your splendid work and help.

Yours truly, E. A. Ryder, Commissioner.

Boston, Mass., Dec. 12, 1916.

Mr. M. C. HUTCHINS, State Fire Warden, Boston, Mass.

Dear Sir:—Complying with your request of Dec. 5, 1916, relative to the activities of this department in cleaning up right of way, etc., beg to advise that during the past year, commencing Jan. 1, 1916, we have cleaned up approximately 200 miles of right of way and adjacent property, cutting the underbrush and trimming trees for fire protection, at a total cost of about \$6,000. Practically the entire length of right of way in the State of Massachusetts has been burned over, with the exception of certain places where it has been too damp to burn up to the present time, although we hope to be able to do this work before the end of the calendar year, weather permitting. This is also true of many parcels adjoining our right of way where permits to burn could be obtained, and where it was not necessary to cut any brush or undergrowth.

Since Jan. 1, 1916, up to and including this date, we have received 94 claims from property owners in the State of Massachusetts, of which 59 claims have been settled for a total of \$2,107.61, leaving a balance of 35 unsettled claims, all of which, however, are for slight damages.

We have paid \$376.19 to various towns in the State of Massachusetts for services in extinguishing fires during the above period, of which amount \$69.05 was paid to





A forest-fire equipment trailer in use by the State District Forest Warden, Mr. A. R. Ordway, who has supervision over the fire work in that portion of the State west of the Connecticut River. An auxiliary amount of fire-fighting equipment is in this way made available in different parts of the Berkshires in a comparatively short time.

three towns on the "Cape," covering services extinguishing nine fires. There has been but one claim from a property owner, resulting from these nine fires, which claim was settled for \$10, the balance of the fires being on wild grass land and causing no damage.

Regarding the matter of patrol work, would say that it has long been our custom, during the dry seasons each year, to place patrolmen on practically every section of the line, whose duty it is to follow up all trains as closely as possible and watch for fires.

Yours very truly, C. B. Rood, General Fire Claim Agent.

FIRE NOTICES.

During the season, 8,000 cloth and cardboard fire notices, prepared by this department, and 5,000 cardboard notices, printed in co-operation with the Massachusetts Forestry Association, were posted along streams, trails and in public places throughout the State by the town forest wardens, fish and game deputies and railroad officials.

Respectfully submitted,

M. C. Hutchins, State Fire Warden.

THE BROWN-TAIL MOTH SITUATION.

We are delighted to report that the brown-tail moths have continued to decrease this year, and that the favorable report of last year can even be improved this season.

State-wide reports show very few nests this fall, and a great decrease even over last year. It is to be hoped that we have had our worst troubles from this obnoxious, for eign insect.

PARASITE WORK.

As has been the custom each year, Dr. L. O. Howard, chief of the Bureau of Entomology, has favored us with a report of the progress of the parasite work during the year. His report dated Dec. 9, 1916, is as follows:—

DEAR PROFESSOR RANE: — As has become the annual custom, I am sending you, in accordance with your recent request, a brief account of the condition of the parasites of the gypsy moth and brown-tail moth, which, during the years 1906 to 1913, were imported into New England by this Bureau in co-operation with the State of Massachusetts and other official organizations and individuals in foreign countries and at home.

No parasites have been imported since the outbreak of the great European war, although an expert assistant in this Bureau, Mr. J. N. Summers, was in Germany at the time the war began and expected to send over some of the species which we have not as yet succeeded in establishing in

New England. As I wrote you last December, the colonization of parasites imported from Europe and Japan continued during the fall of 1915, and this work was going on at the time of writing. One hundred and fifty-nine colonies of the Japanese egg parasite known as Schedius kuvanae were liberated in 28 towns in Massachusetts and 11 in New Hampshire, — 661,713 individuals in all. During the spring of 1916, another imported parasite of gypsy moth eggs, Anastatus bifasciatus, originally procured from Hungary, but also occurring in other parts of Europe as well as in Japan, was colonized in 14 towns in Maine, 31 towns in New Hampshire and 71 towns in Massachusetts, a total number of 12,286 colonies being liberated, containing 12,286,000 individuals. Both of these species of egg parasites are doing very good work, and recoveries have been made from very many of the colonies previously planted in the field.

Apanteles lacteicolor, a Braconid parasite which attacks small caterpillars of both the gypsy and brown-tail moths, has been recovered this year in greater numbers than during the previous years. Two other species, namely, Meteorus versicolor and Apanteles melanoscelis, have increased in most of the colonies which have been liberated, and have spread over a large area from the original colony site. We have made an effort this year to secure a large number of both of these species in order to start new colonies in other localities.

It has transpired that the imported tachinid fly, Compsilura concinnata, attacks many species of native caterpillars. It is therefore a very beneficial insect, and, as it attacks native species, the continuity of its existence in this country is very sure. Another imported tachinid fly, Zygobothria nidicola, has been found more abundantly than before.

The European tree-climbing ground beetle, Calosoma sycophanta, which has come to be known in New England as the Calosoma beetle, has apparently not been so numerous in certain localities as it was last year, but it has continued its good work and keeps on spreading. There is no doubt of the thorough establishment of this species nor of the fact that it is a very efficient enemy of both gypsy moth and brown-tail moth as well as of native caterpillars. For example, it feeds voraciously upon both the fall webworm and the tent caterpillar.

Yours most truly,
L. O. Howard,
Chief of Bureau.

REPORT ON METHOD OF SPRAYING FROM THE TOP OF TANK INSTEAD OF FROM THE GROUND.

After experiments in this method of spraying, noting results of work and costs, it was adopted in one division of the State under Mr. W. A. Hatch's supervision. This report is based upon the results of his experience. For a number of years we did not believe the work could be done in this manner as

effectively as in the usual manner, that is, from the ground. The tank method presented some obstacles which required study and systematizing to overcome; but it was possible to do this, and now by this method effective work can be done at decreased cost. Reasons in favor of this method are:—

First. — The work can be done with a decreased force of men, the proper number to operate being four men, superintendent, engineer, driver and nozzleman. This can still be decreased by one man if the superintendent handles nozzle, but this is not economical as the fourth man is required on the odd ends of the work.

Second. — There is a decreased wear on the spraying hose, as usually only 50 feet are in use. This is coiled on top of the tank and is not subject to dragging in the dirt nor does it require one or more men to carry it.

Third. — Added height in throwing the spray is gained, which is a factor of the greatest importance, as the greatest flaw in all spraying work is insufficient drenching in the tops of the trees.

Fourth. — Compactness of the operators is also a factor, superintendent, engineer, driver and nozzleman being so near together that the machine can be operated practically as by one man.

Fifth. — The work is less laborious, and this is a point of value inasmuch as a man not overworked will do his work more thoroughly.

Sixth. — These points all combine to decrease cost of the work.

Reasons advanced against the method are mainly that the hose cannot be carried around the tree, thus insuring spraying from all sides. We overcome this obstacle by beginning our spraying simultaneously in all towns just as the buds are breaking upon the trees and the young caterpillars are hatched and feeding. Under these conditions the leaves offer no shelter to the farther side of the tree, the spray passes through unchecked, and is very effective. It is possible to spray rapidly under these conditions, and we strive to do the greater part of the work while the leaves are small. Later when the leaves are larger, the nozzleman, being in constant communication

with the driver, has the team halted at the proper intervals, sprays the tree as he approaches it, then directly broadside, and then upon the other side when the tree is passed. A careful man by this method can cover the entire tree, as no tree is a solid, compact mass, every tree having open, clear spaces between the limbs and up through the top, and by directing the stream at these openings the spray passes through and falls on the farther side.

Another reason against the tank method is that the road is sometimes too distant from the bordering trees. This is not generally the case. The team can usually be brought near enough, and then the added height and throwing power from the tank does the rest. But if it is not possible to approach near enough to a tree or group of trees, it requires but a moment to shift and spray from the ground.

Here are a few points which are a distinct help in the application of the spray: —

First. — That the nozzleman be provided with a seat of the proper height and dimensions in general, so that he can turn and move unhampered in the act of spraying.

Second. — That he have nozzle tips of the different diameters directly upon his person, so that quick changes can be made when conditions require.

Third. — That the length of hose under pressure be strapped to the tank by a buckled strap.

Fourth. — That the short, light nozzle be used in all locations where it will do the work, as it can be manipulated better.

To apply the spray intelligently and with the greatest economy it is necessary to make frequent change of spraying tips, the one-quarter inch to the three-sixteenths inch, or conversely. If a three-sixteenth inch tip should be devised, with a bore to fit upon a thread placed upon the one-quarter inch tip, it would facilitate matters, as less than one-half the time would be required in making the change.

APPORTIONMENT OF GENERAL EXPENSES.

The Commission on Economy and Efficiency recommended in its report on this department filed in December, 1914, that the general expenses of the department be apportioned among the several appropriations made for its work. The question has been discussed during the past year with the Auditor's Department and the office of the Supervisor of Administration, successor to the Commission on Economy and Efficiency, and the conclusion reached that a better way to deal with the matter is to make a separate appropriation for these general purposes.

FORESTRY MEETINGS.

During the past year the American Forestry Association held its annual meeting in Boston on January 17–19, and it was our good pleasure to have a large number of friends from all sections of the United States and Canada here in Massachusetts on that occasion. The meeting was well attended and the papers, addresses and discussions proved of great interest.

Following the above meeting, a meeting of Eastern Foresters was held in Boston at the invitation of this department. Among other things, arrangements were made to take the association and their guests in a special car to Weston, 11 miles from the State House, where we entertained them at a regular New England lumber camp. After looking over the mill and general operations, a typical lumberman's dinner was served in the mess camp. The association then held its afternoon session in the bunk house, and altogether the occasion was a particularly appropriate ending to the meeting.

One day was set aside also for a meeting of the collaborators of the United States Forest Service on forest-fire work. This meeting was held in the hearing room of the Massachusetts Public Service Commission.

Co-operative Moth Work.

Until last year this department has included each year in this report a detailed account of the splendid co-operative work that is done on the North Shore. The city of Beverly and the town of Manchester and the summer residents of that

\$3,381 46

section have set an ideal example of how co-operation and public interest can be made to serve a section of the State. While we would still be pleased to incorporate this work in this report, it is a task too arduous to ask of the North Shore committee each year, as their work has expanded to road building, mosquito control, etc. Suffice it to say, however, that the North Shore work is being prosecuted with the same high standard of efficiency as ever. The work is handled by our division superintendent, Mr. Saul Phillips, and his assistant, Mr. Donovan, who have been at the helm for a number of years. The chairman of the committee, Col. Wm. D. Sohier, reports that his people are as enthusiastic as ever. The amount of work done and the expense of same are given below.

Following the example set by the North Shore, the Dover woodland work, the Sagamore Beach moth work, and many similar enterprises have continued to accomplish satisfactory results.

	Ю.	PECLAL	T	UNDS.			
	No	rth Sh	ore	Fund	ł.		
Balance from 1915, .						\$6,810 30	
Receipts:—							
Paul D. Kneeland, agent,						189 24	
F. W. Rane, State Forester	٢,					6,000 00	
Wm. D. Sohier, agent for p	orop	erty o	wn	ers,		2,462 90	
Wm. D. Sohier, agent, .						6,000 00	,
City of Beverly,						3,000 00	
Town of Manchester, .						3,000 00	
Gasoline and oil sold, .						6 10	
Massachusetts Highway Co	omr	nission	ι,			201 20	
Appropriation for suppres	ssio	n of	gy]	psy a	nd		
brown-tail moths, .						3,406 20	
							\$31,075 94
Expenditures: —							
Pay roll,						\$15,097 73	
Travel,						728 49	
Supplies,						10,122 27	
Rent of store,						290 00	
Maps,						2 31	
Sundries,						1,453 68	
							27,694 48

Balance on hand, Nov. 30, 1916,

			Do	ver	Gypsý	M	oth	Fund.				
Balance fr	om 1	1915,							\$198	30		
Receipts	s:											
For wood	sold,				•	٠			2,410	63		
For sprayi	ing,								690	03		
											\$3,298	96
Expendi	iture	s:										
Pay roll,									\$2,761			
Supplies,				,•					. 7	34		
Teaming,								. `	59	00		
											2,827	61
Balan	ce o	n hand	Nov.	30), 1916,						\$471	35

There is an unpa d account for arsenate of lead, due the appropriation for suppressing gypsy and brown-tail moths, which will be paid as soon as sufficient collections are made.

	Sag	amor	$B\epsilon$	each	Gyps	sy M	oth.	Fund.		
Balance from 1915	,							\$479	69	
Receipts: —					,					
For wood sold,				a.				130	50	
For spraying, .								464	03	
T. Walter Proctor,									00	
										\$1,174 22
Expenditures: -										
Pay roll,								\$467	09	•
Travel,								10	75	
Supplies,								360	65	
Sundries,		- 0						6	00	
								-		844 49
Balance on ha	nd,	Nov.	30,	1916	6,					\$329 73

REPORTS ON MOTH WORK FROM CITIES AND TOWNS.

These reports are all made and are in the hands of the State Forester. They give much valuable information, but as it would be a considerable expense to print these individual reports, and as this report is already comparatively large, we are compelled to omit them. They are on file in this office, subject to inspection from year to year.

The following is a brief summary of the accomplishments of each division:—

Mr. Parkhurst's Division.

296 acres thinned; 116 acres reforested with white pine, 34,000 pines.

Mr. Hatch's Division.

480 acres thinned; 40 acres to be thinned this year and reforested. 527 miles old roadside thinning, 73 miles new.

Mr. Phillips's Division.

609 acres thinned; 13,000 white pine and 2,000 hemlocks planted. 101 miles old roadside thinning, 20 miles new.

Mr. Fitzgerald's Division.

277 acres thinned; 21,000 white pine planted. 17 miles old roadside thinning, 27 miles new.

Mr. Farley's Division.

268 acres thinned.

Mr. Holmes' Division.

175 acres thinned; 35 acres reforested.

470 acres being thinned at the present time.

93 miles old roadside thinning, 55 miles new.

35 acres to be reforested.

Mr. Enwright's Division.

763 acres thinned; 30,600 pines planted. 95 miles old roadside thinning, 57 miles new.

Mr. Ramsey's Division.

75 acres of woodland brushed over.

31 miles of old cutting along the roadsides.

42 miles of new cutting along the roadsides.

Improvement thinnings, done under the direct supervision of Mr. Kneeland and Mr. Cook, are reported elsewhere.

Care of Trees in the City of Boston.

DEAR SIR: — I beg to submit the following report of the moth work performed by the city of Boston for the season of 1915 and 1916. During the year the entire city was covered, the residential part being done by destruction and spray work and the entire woodland section by spraying It is gratifying to state that there was no defoliation of any kind.

At the present time we have sixty-five men employed on destruction work, and, during the spraying season, eleven large F. & G. sprayers and one auto F. & G. sprayer were kept busy.

Infestation has completely disappeared in certain sections and is at least 80 per cent. less all over the city than it was ten years ago when we first started a systematic campaign to suppress the ravages of these pests.

The brown-tail moths have left us and I hope they will never return.

The woodland section of Boston is in first-class condition and under perfect control.

Cavities in the street trees are being treated with cement, and dead branches are being removed as fast as possible.

We have planted over six miles of street trees during the year, and have removed the leopard borer from over 7,500 young trees.

The following items show the expenditures for the year: —

Supervision and la General supplies, Teaming,						\$26,325 7,130 2,145	13
Total, .		٠	• .			\$35,601	12

Respectfully submitted,

WILLIAM F. LONG, Superintendent, Street Trees and Moth Work.

DEC. 19, 1916.

Care of Trees in the Town of Brookline.

BROOKLINE, MASS., Dec. 27, 1916.

DEAR SIR: — The following is a report of the moth work done in Brookline for the year ending Dec. 31, 1916.

The appropriation for the suppression of insect pests was \$27,000, of which there is an unexpended balance of \$853.89. The usual winter work of creosoting the egg clusters of the gypsy moths and the removal of brown-tails has been done throughout the town.

Spraying was done last summer as usual.

The appropriation recommended this coming year for suppression of insect pests includes an item of \$3,000 for leopard moth work. This insect is one of the most formidable enemies we now have on our trees, and a strenuous campaigning will be waged against him this coming year.

The department asks the town for an appropriation of \$20,000 to carry on the work for this coming year. This is \$7,000 less than last year. The decrease is made possible by the small amount of spraying necessary for the gypsy moth next season.

Very truly yours,

Daniel G. Lacy,

Superintendent.

STATE HIGHWAY WORK.

Along the State highways spraying and cleaning for the gypsy and brown-tail moths and the elm-leaf beetle were done under the direction of this department. Bills for this work were approved by us and transmitted to the State highway department for payment. The list of towns and cities in which the work was done is as follows:—

WORK ON STATE HIGHWAYS, 1916.

	-							
Abington,				\$20 60	Dennis, .			\$208 75
Acton, .				135 13	Dover, .			73 15
Agawam, .				28 50	Dracut, .			76 90
Amesbury,				35 89	Duxbury, .			70 94
Amherst, .				35 00	Easthampton,			19 50
Andover, .				51 65	Essex, .			21 74
Ashburnham,				77 25	Falmouth,			164 85
Ashby, .				57 50	Fitchburg,			85 11
Ashland, .				38 65	Foxborough,			22 96
Attleboro,				21 07	Framingham,			84 71
Avon, .				10 30	Franklin, .			38 00
Ayer, .				40 35	Gardner, .			13 55
Barnstable,				121 65	Gloucester,			71 14
Barre, .				49 98	Grafton, .			55 50
Bedford, .				45 15	Greenfield,			36 90
Beverly, .				186 46	Groton, .		1.	20 18
Billerica, .				72 44	Groveland,			11 03
Bourne, .				150 57	Hadley, .			50 00
Boxborough,				116 40	Hamilton,			69 52
Braintree,				25 00	Hanover, .			15 68
Brewster, .				87 00	Harvard, .			50 33
Bridgewater,				28 72	Harwich, .			6 00
Brookfield,				42 39	Haverhill,			137 36
Burlington,			•	131 00	Hingham,			20 11
Canton, .				50 20	Holden, .			8 51
Chelmsford,		•	•	123 30	Holliston,			23 27
Chicopee,	•	•		37 50	Hudson, .			33 98
Cohasset, .	٠	•	•	55 22	Ipswich, .	•	. •	40 80
Concord, .		•	•	380 49	Kingston,			4 18
Dedham, .		•		56 25	Lakeville,			17 00
Deerfield, .	•	•		9 55	Lancaster,			34 49

Work on State Highways, 1916 — Concluded.

				 _	
Leominster, .		\$44 24	Scituate		\$57 70
Lexington, .		107 51	Shirley,		22 75
Lincoln,		58 73	Shrewsbury, .		119 10
Littleton,		79 16	South Hadley, .		55 00
Lowell,		52 30	Southborough, .		47 80
Lunenburg, .		88 14	Sterling,		150 90
Marion,		15 70	Stockbridge, .		79 20
Marlborough, .		286 73	Stoneham, .		82 16
Marshfield, .		97 05	Sudbury,		149 51
Mashpee,		24 10	Sutton,		12 20
Melrose,		41 98	Taunton,		10 40
Merrimac, .		29 83	Templeton, .		45 55
Methuen,		71 65	Tewksbury, .		110 96
Middleborough,		60 25	Townsend, .		93 00
Middleton, .		11 20	Tyngsborough, .		171 00
Millbury,		29 86	Uxbridge,		14 74
Milton,		10 00	Ware,		2 50
Montague, .		30 50	Wareham, .		39 61
Natick,		72 04	Warren,		48 79
Needham, .		64 16	Wayland,		55 11
Newbury,		52 39	Wellfleet,		19 75
Newburyport, .		23 58	Wenham,		107 74
North Adams, .		57 80	West Boylston, .		62 85
North Andover,		153 01	West Bridgewater,		26 47
North Reading, .		58 25	West Brookfield,		27 95
Northborough, .		108 98	West Newbury,		107 35
Northbridge, .		6 00	West Springfield,		35 00
Northfield, .		75 00	Westborough, .		26 77
Norton,		25 50	Westfield,		55 00
Norwood,		86 15	Westford,		142 80
Orleans,		27 60	Westminster, .		42 71
Palmer,		41 83	Weston,		83 00
Pembroke, .		35 18	Westwood, .		24 00
Pepperell,		84 81	Weymouth, .		122 29
Princeton, .		7 50	Williamstown, .		55 90
Quincy,		19 90	Wilmington, .		73 41
Reading,		104 00	Winchester, .		66 63
Rochester, .		44 45	Woburn,		176 93
Rockport, .		11 40	Worcester, .		67 60
Rowley,		91 64	Yarmouth, .		28 00
Salisbury,		96 79		_	
Sandwich, .		65 00			\$9,179 32

THE DISTRIBUTION OF SUPPLIES.

The following is a list of cities and towns, with amount of supplies for moth work furnished them, for the year ending Nov. 30, 1916. The amounts given are the gross amounts furnished, some of the cities and towns having made payments to the State Forester's office for all or a part of the amounts, according to the amount of their net expenditures or their class under the provisions of the law. For amounts received from this office in reimbursement and supplies see the table on page 87. The number of towns and cities receiving supplies has increased very materially, owing to the large demand for arsenate of lead which we are required by law to furnish.

List of Towns and Cities and Amounts of Supplies furnished for 1916.

			_						
Acton				\$790 30	Concord, .				\$482 40
Andover, .	•	:		1.261 95	Danvers, .		:	·	1,023 81
Ashburnham.	:	•		106 19	Dedham, .				866 39
Ashby.			•	242 64	Douglas, .		•	•	1 83
Ashland, .	•		•	253 55	Dover			•	640 00
Attleboro.		-•	•	64 00	Dracut			•	664 67
Auburn, ,			•	75 52	Dunstable,			•	468 27
Avon.			•	48 70	Duxbury.		•	Ċ	1,076 42
Ayer, .		:	·	477 46	East Bridgewate		•	•	376 80
Barnstable.				1,038 24	77 17				64 00
Bedford, .				624 77	Easton		•	•	384 00
Berkley, .			•	31 25	Essex, .		•	·	146 74
Berlin, .				557 48	Fall River,			•	96 00
Beverly,			Ċ	276 75	Falmouth.	•		•	320 00
Billerica, .		•	Ċ	1 2.250 26	Fitchburg.	•		•	640 00
Blackstone,				13 38	Gardner, .	•	:	•	77 55
Bolton.	·		Ċ	760 52	Georgetown,	•		·	638 70
Boxborough,			Ċ	670 44	Gloucester,	•	•	Ċ	767 54
Boxford, .	·		Ċ	1 1.993 00	Grafton.	•	•	Ċ	79 71
Boylston, .				29 25	Greenfield,	•		Ů	96 00
Braintree.	·		•	738 00	Groton.	•		•	762 76
Bridgewater,	•		•	488 81	Groveland,	•		·	243 64
Burlington,			•	931 15	Halifax.	•	:	•	4 543 74
Cambridge,			•	387 45	Hamilton,	•		•	795 62
Canton, .			•	² 2,299 96	Hanover.	•	•	•	684 88
Carlisle, .		:	•	495 79	Hanson,	•	. 4	•	4 848 68
Carver, .				² 1.463 12	Harvard, .	•	•	•	902 11
Chelmsford,	•		i	1,131 74	Harwich.	•	•		110 84
Clinton, .	·		•	128 00	Hingham,	•		•	1.122 75
Cohasset,		:	·	1 2,433 42	Holbrook,	•			4 572 37
Commodely .	•	•		2,100 42	IIOIDIOUK,	•	•	•	012 01

¹ Includes one large power sprayer.

² Includes two small power sprayers.

³ Includes four small power sprayers.

⁴ Includes one small power sprayer.

List of Towns and Cities and Amounts of Supplies furnished for 1916 — Continued.

Holden, \$146 38 Peabody, \$768 0 Holliston, 143 08 Pembroke, *2,184 9 Hopkinton. 88 98 Pepperell, 503 2 Hudson, 628 33 Plainville, 66 3 Ipswich, 1,156 53 Plympton, *2 520 1 Kingston, 392 58 Prescott, 18 4 Lakeville, *1,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, *2,319 6 Lancaster, 384 00 Randolph, 118 6 Lecominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Reading, 1,649 0 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1
Holliston, 143 08 Pembroke, 3 2,184 9 Hopkinton. 88 98 Pepperell, 503 2 Hudson, 628 33 Plainville, 66 3 Ipswich, 1,156 53 Plympton, 2 520 1 Kingston, 392 58 Prescott, 18 4 Lakeville, 1 1,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, 1 2,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marblebead, 96 00 Sandwich, 93 1<
Hopkinton. 88 98 Pepperell, 503 2 Hudson, 628 33 Plainville, 66 3 Ipswich, 1,156 53 Plympton, 2 520 1 Kingston, 392 58 Prescott, 18 4 Lakeville, 11,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, 12,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 11,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3
Hudson, 628 33 Plainville, 66 3 Ipswich, 1,156 53 Plympton, 2 520 1 Kingston, 392 58 Prescott, 18 4 Lakeville, 11,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, 12,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 11,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 21,384 21 Scituate, 1,431 9
Ipswich, 1,156 53 Plympton, 2 520 1 Kingston, 392 58 Prescott, 18 4 Lakeville, 11,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, 12,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 11,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marblehead, 96 00 Sandwich, 93 1 Marblehead, 96 00 Sandwich, 93 1 Marshfield, 21,384 21 Scituate, 1,431 9
Kingston, 392 58 Prescott, 18 4 Lakeville, 1 1,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, 1 2,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 1 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 2 1,384 21 Scituate, 1,431 9
Lakeville, . ¹ 1,921 99 Princeton, 345 9 Lancaster, 640 00 Quincy, . ¹ 2,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, ¹ 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Mansfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, ² 1,384 21 Scituate, 1,431 9
Lancaster, 640 00 Quincy, 1 2,319 6 Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 1 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Mansfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 2 1,384 21 Scituate, 1,431 9
Leominster, 384 00 Randolph, 118 6 Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marsfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 2 1,384 21 Scituate, 1,431 9
Lexington, 1,514 99 Raynham, 157 5 Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Marsfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 21,384 21 Scituate, 1,431 9
Lincoln, 1,965 19 Reading, 1,649 0 Littleton, 805 51 Rehoboth, 148 1 Lowell, 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 64 4 Marsfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 21,384 21 Scituate, 1,431 9
Littleton, 805 51 Rehoboth, 148 1 Lowell, 1,880 52 Revere, 96 0 Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Mansfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 21,384 21 Scituate, 1,431 9
Lowell, . 1,880 52 Revere, . 96 0 Lunenburg, . 919 15 Rockland, . 369 0 Lynnfield, . 734 01 Rockport, . 246 2 Malden, . 256 00 Rowley, . 755 8 Manchester, . 251 50 Royalston, . 6 4 Mansfield, . 73 80 Salisbury, . 518 0 Marblehead, . 96 00 Sandwich, . 93 1 Marlborough, . 830 67 Saugus, . 720 3 Marshfield, . 21,384 21 Scituate, . 1,431 9
Lowell, . 1,880 52 Revere, . 96 0 Lunenburg, . 919 15 Rockland, . 369 0 Lynnfield, . 734 01 Rockport, . 246 2 Malden, . 256 00 Rowley, . 755 8 Manchester, . 251 50 Royalston, . 6 4 Mansfield, . 73 80 Salisbury, . 518 0 Marblehead, . 96 00 Sandwich, . 93 1 Marlborough, . 830 67 Saugus, . 720 3 Marshfield, . 21,384 21 Scituate, . 1,431 9
Lunenburg, 919 15 Rockland, 369 0 Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Mansfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 2 1,384 21 Scituate, 1,431 9
Lynnfield, 734 01 Rockport, 246 2 Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Mansfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 2 1,384 21 Scituate, 1,431 9
Malden, 256 00 Rowley, 755 8 Manchester, 251 50 Royalston, 6 4 Mansfield, 73 80 Salisbury, 518 0 Marblehead, 96 00 Sandwich, 93 1 Marlborough, 830 67 Saugus, 720 3 Marshfield, 2 1,384 21 Scituate, 1,431 9
Manchester, . . 251 50 Royalston, . . 6 4 Mansfield, .
Mansfield, . . 73 80 Salisbury, . . . 518 0 Marblehead, . . . 96 00 Sandwich, . . . 93 1 Marlborough, . . . 830 67 Saugus, .
Marblehead, . <td< td=""></td<>
Marlborough, 830 67 Saugus,
Marshfield, 21,384 21 Scituate, 1,431 9
Marshfield, *1,384 21 Scituate, 1,431 9 Mashpee, *2408 96 Sharon,
Mashpee,
Maynard, 228 90 Sherborn, 900 1
Medfield, 12,067 69 Shirley,
Medford, 256 00 Shrewsbury, 113 5
Medway, 166 05 Somerset, 164 0
Merrimac, 117 99 South Hadley, 32 0
Methuen, 1,065 28 Southborough, 450 9
Middleborough, 3 1,927 51 Sterling, 352 7
Middleton, 474 21 Stoneham, 955 8
Millbury,
Millis,
Milton, 2,453 95 Sudbury, 1,016 2
37 .1 1
Newbury, 691 51 Templeton, 2 502 0
Newburyport, 543 70 Tewksbury, 766 1
Newton, 5,342 44 Topsfield, 471 3
Norfolk, 137 33 Townsend, 627 5
North Andover, 11,964 35 Truro,
North Attleborough, 123 50 Tyngsborough, 918 4
North Reading, 1,131 73 Wakefield, 546 9
Northborough, 689 24 Walpole, 218 1
Northbridge, 96 Waltham, 1,774 3
Norton, 64 00 Wareham, 256 5
Norwell, 902 66 Warren,
Norwood, 866 75 Watertown,
, , , , , , , , , , , , , , , , , , , ,

¹ Includes one large power sprayer.

¹ Includes one small power sprayer.

³ Includes two small power sprayers.

List of Towns and Cities and Amounts of Supplies furnished for 1916 — Concluded.

	1916 — (Concluded.			
		1			
Wayland,	\$1,301 75	Weston, .			. 1\$3,974 01
Wellesley,	129 15	Westwood,			. 640 00
Wellfleet,	2 11	Weymouth			. 1,495 20
Wenham,	548 54	Wilmington	1, .		. 1,070 41
West Boylston,	169 28	Winchendo	n, .		. 319 48
West Bridgewater,	442 24	Winthrop,			. 76 80
West Newbury,	355 97	Woburn, .		•	. 639 63
Westborough,	224 63	Worcester,	•	•	. 1,036 92
Westford,	1,120 77				0110 274 17
Westminster,	126 17				\$118,374 17
1]	ncludes one la	rge power spray	er.		
Dover gypsy moth fund,					. \$995 65
East Gardner State Colony,					. 61 74
Pine Banks Park,					. 218 75
State Forest Commission,					. 23 52
Prevention of forest fires,					. 153 16
State forester's expenses,					. 58 06
Massachusetts School for Fe Metropolitan Water and Sew Special North Shore fund,	eble-minded,				. 66 15
Metropolitan Water and Sew	erage Board	l,			. 147 60
				•	. 7,045 93
Purchase and planting of for			•	•	. 14 73
Sagamore Beach gypsy moth	fund, .		•	•	. 354 70
Thinning work, Traveling sprayers,			•	•	. 247 82 . 719 56
Traveling sprayers, .	•			•	. 719 50
					\$10,107 37
Appropriation for S	SUPPRESSI	ON OF GY	PSY AN	то В	ROWN-TAIL
	Mo	THS.			
		STATEMENT.			
Balance on hand, Nov. 30					\$88,944 48
Less reimbursement paid	for 1915,	• . •		•	18,224 48
Balance for 1916 wor	k, .				\$70,720 00
	Rece	eints.			
Andover,			\$567	83	
Attleboro,				: 00	
		• • •			
Auburn,				30	
Ayer,			1,245		
Barnstable,			1,497	96	
Amounts carried forwa	ard,		\$3,422	14	\$70,720 00

Amounts	brou	ight j	forwa	rd,					\$3,422	14	\$70,720 00
Belchertown,									13	85	
D 1	•	•	•	•	•	•	•	•	276		
Blackstone,						•		:	13		
Boylston,	•	•	•	•	•	•	•	•	491	-	
Braintree,			•	•		•	•	•	738	~	
Cambridge,			•	•			•	:	387	•	
a .		•	•	•	•	•	•	•	89		
CII.		•	•	•	•	•	•	•	128		
Cohasset,				•	•	•	•		1,830		
Concord,	•		•	•	•	•	•	•	121		
Danvers,	•	•	•	•	•	•	•	•	260		
Dedham,				•	•	•	•	•	879		
Douglas,				•	٠.	•	•	•		83	
				•	•	•	٠.	•	640		
Dover, . East Bridgew			:	•	•	•	۰	•	376	-	
East Drugew Easthampton				•	•	•	٠	•	64		
	•	* .	•	•	•	•	٠	• 1	384		
Easton, .	•	•	•	•	٠	٠	٠	•		45	
Edgartown,	•	•	•	•	•	•	•	•	797		
Essex,	•	•	•	•	•	•	٠	• .			
Fall River,	•	•	•	•	•	٠	•	•	96		
Falmouth,	•	•	۰	•	•	•	•	•	320		
Fitchburg,	•	•	•	٠	٠	•	•	•	640	-	
Franklin,	•	۰	•	•	•	•	•	•	157		
Gardner,	•	•,		•	•	•	٠	•	77		
Gloucester,	•	* *	•	•	•	٠	•	•	332		
Grafton,	•	•		•	•	•	٠	•	78	-	
Greenfield,	•	•	•	•	•	• .	٠	•	96	-	
Hamilton,	•	•	•	•	•	•	•	•	219		
Hanson, .	•	•	•	• .	•	•	•	•	146		
Hingham,		•	•	٠	•	۰	٠		1,122		
Holden, .	•		•*	•	•	•	•	•	1,051		
Holliston,		•	14	•	•				140		
Hopkinton,		• `							755		
Ipswich,			٠				•		57		
Lakeville,									79	00	
Lancaster,							•	.,	640		
Leominster,									384	00	
Lowell, .					٠				387	41	
Manchester,									251	50	
Mansfield,		•.						• ,	73	80	
Marblehead,									96	00	
Maynard,									228	90	

Amounts carried forward, \$18,349 22 \$70,720 00

Amounts	s bro	night	for	vard,					\$18,349 22	\$70,720 00
Medford,	۰								256 00	
Medway,									166 05	
Methuen,									317 37	
Millbury,								•	26 68	
Millis, .									256 00	
Natick, .									53 53	
New Bedford						•		•	124 25	
Newburypor			•			:		•	543 70	
North Andor									6 61	
Northbridge,								•	2 04	
Norton, .								•	171 75	
Norwood,	۰	٠			٠	•	•	•	866 75	
Orange,'.	٠		٠		٠	•	•	٠	1 80	
Orange, .		٠	•		٠	•	•	٠	1 08	
Oxford, .	٠	٠	٠	•	٠	٠	٠	٠	768 00	
Peabody,	٠	•	•	•	٠	•	٠	٠		
Prescott,	٠	•	٠	•	•	•	•		18 45	
Princeton,	•	•	•	•	٠		• ,	-	848 10	
Quincy, .	٠	•	٠	•	•	•	•	•	1,118 15	
Reading,		•	•	•	•		•	•	454 17	
Rehoboth,		•						•	144 10	
Revere, .					•		•	•	96 00	
Rockland,		٠	•		•				369 00	
Rockport,		٠	•						246 25	
Rowley, .		٠							7 41	
Royalston,									6 40	
Saugus, .									178 51	
									38 40	
Shirley, .									23 17	
Shrewsbury,									453 91	
South Hadle	у,								32 00	
Stoughton,						/			60 93	
Stow, .									39 68	
Sutton, .									1 08	
Swampscott,									295 20	
FID (348 25	
Templeton,									1,475 68	
Topsfield,									2,293 64	
Upton, .							•		1 08	
Uxbridge,					•		•		1 08	
Wakefield,			•	•			•		520 01	
Walpole,		•	•	•			•		218 15	
Waltham,			•	•			•	•	116 99	
· · withining	•	*	•	•	٠	•	•	•	110 99	

Amounts carried forward, . . . \$31,316 62 \$70,720 00

Amounts	brough	t forwe	ard,					\$31,316	62	\$70,720	00
Wareham,								256	54		
Warren, .								128	00		
Watertown,								115	20		
Wellesley,								129	15		
Wenham,								90	79		
West Boylston								816	05		
West Newbur								38	44		
Westborough,								39	81		
Westwood,								640	00		
Weymouth,						.7		1,495	20		
Winthrop,									80		
Woburn,		7.4						857	72		
Worcester,								854	75		
East Gardner	State	Colon	y,					55	35		
Grafton State	Hospi	ital,					٠	5	63		
Massachusett								66	15		
Metropolitan	Water	and S	ewer					147	60		
M. Guptill,								12	80		
Paul D. Knee	land, a	gent,						6	00		
Paul D. Knee	land, a	gent,	use o	f out	fit,			70	16		
Rebate, Bosto	n Wov	en Ho	se an	d Ru	bber	Con	n-				
pany, .								145	57		
Refund, Geo.								26	70		
Tires sold,								12	35		
State Forest C	Commi	ssion,						19	29		
State Forester	's expe	enses,						72	74		
Prevention of	forest	fires,						329	08		
Prevention of Purchase and	plantin	ng of f	orest	land	s,			14	73		
Sagamore Bea	ch gyp	sy mo	th fu	ınd,				354	70		
Special North								6,812	83		
Special South						•		. 1	39		
							-			45,008	14
										\$115,728	
Appropriation	for 19	16,							•	175,000	00
										\$290,728	14

000			Exp	endit	ures.					
Office expenses: —							@2 OOO	07		
Salaries of clerks, . Rent of offices, .		۰	. •	•	•	•	\$3,090			
Stationery and posta							1,138			
Printing,							1,293	25		
Experts,							69	20		
Moth thinnings (sup)	olies)	, .					116	67		
Supplies,								75		
Books, photographs,										
Sundries,										
Culture,	•	Ť								
Field expenses: —										
Pay roll,							22,020	32		
Town pay rolls, .							26,885			
Travel,							11,083			
Supplies,										
Teaming, repairs, etc										
Special work, .										
Rent of store, .										
Store equipment, .										
Reimbursement to to	wns,		•				12,152	53		
	•					,			212,360	59
Balance Nov. 30	, 191	6,							\$78,367	55

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

The following table shows the reimbursement, amount of supplies furnished, and net amount received from this office by cities and towns for 1915, the required expenditure before receiving reimbursement from the State, the total net expenditure, the amount received for work on private property returned to this office, the amount paid in reimbursement, gross amount of supplies, and total net amount received from this office by cities and towns for 1916, and also the required expenditure for 1917:—

			1915.				1916.	6.			1917.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi-	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Abington,	ಣ	ı	1	1	\$1,505 35	1	,	1	1	1	\$1,498 09
Acton,	က	\$179 59	\$574 77	\$754 36	1,005 76	\$957 12	\$532 471 146 50	-	\$790 30	\$741 66	1,007 59
Acushnet,	60	1	1	1	487 08	1	-	ı	1	1	516 42
Amesbury,	2	ı	3	1	2,712 77	1	1	1	1	1	2,910 97
Andover,	2	ı	755 03	187 20	3,577 76	2,868 00	1,061 88	1	1,261 95	441 75	3,570 38
Arlington,	-	1	1	3	2,000 00	1	ı	,	1	•	2,000 00
Ashburnham,	67	348 00	341 88	88 689	466 35	724 18	11 25 1	\$257 83	106 19	364 02	503 74
Ashby,	63	207 77	264 74	472 51	316 01	470 81	143 94 1	154 80	242 64	397 44	319 16
Ashland,	က	,	138 45	138 45	24 00	614 12	148 15	40 12	253 55	293 67	639 81
Athol,	2	,	1	ı	2,677 37	1	1	1	1	1	2,708 91
Attleboro,	1	1	1	1	2,000 00	1	ı	1	64 00	1	2,000 00
Auburn,	က	1	47 30	1	714 63	363 32	228 99	ı	75 52	ı	735 02
Avon,	က	117 37	81 89	199 26	450 61	583 82	26 90	133 21	48 70	181 91	467 46
Ayer,	က	1	285 60	209 42	975 67	614 28	176 20	ı	477 46	156 42	998 17
Barnstable,	63	1	2,862 88	2,388 43	3,788 26	1	1	1	1,038 24	1	3,721 72
									~		

1 Arsenate of lead sold.

				1916.				1916.	.91			1917.
CITIES AND TOWNS.	**	СІаяв.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Barre,		60	1	1		\$1,132 90		ı	1	1		\$1,137 36
Bedford,	9	89	\$700 00	\$785 90	\$1,485 90	795 51	\$1,646 42	\$756 19	\$850 91	\$624 77	\$1,475 68	856 03
Bolchertown,		co	I	13 85	1	400 34	1	1	1	1	1	411 08
Bellingham,		60	1	1	1	410 06	ï	1	1	ı	t	443 66
Belmont,		2-1	1	ı	ı	4,563 81	1	ı	ı	1	ı	2,000 00
Berkley,		က	52 27	16 52	68 79	228 51	107 25	58 36	1	31 25	1	238 32
Berlin,	•	60	200 00	358 99	558 99	268 13	628 73	176 401	9 360 60	557 48	918 08	269 80
Beverly,		-	ı	ł	1	2,000 00	1	1	1	276 75	1	2,000 00
Billerica,		က	1	784 13	702 54	2,203 17	2,583 68	295 49	ŧ	2,250 26	1,650 26	2,312 06
Blackstone, .	•	60	1	1	ſ	986 20	ŧ	ı	1	13 38	- 1	1,004 08
Bolton,		က	228 08	290 63	11 818	313 13	937 42	86 45	624 29	760 52	1,384 81	438 01
Boston,		-	3,000 00	t	3,000 00	2,000 00	12,488 20	14,703 42	2,000 00	1	2,000 00	2,000 00
Bourne,		63	1	1	1	2,963 65	1	1	1	1	1	3,112 44
Boxborough,	•	es	820 00	595 20	1,445 20	122 22	89 998	389 831	744 46	· 670 44	1,414 90	122 74
Boxford,		60	20 999	419 29	985 36	541 48	1,041 23	119 37 1	1	1,993 00	1,393 00	679 56
Boylston,		8	503 14	108 69	611 83	228 33	624 74	263 02	396 41	29 25	425 66	234 29
Braintree,		83	1	í	1	3,794 33	1	1	1	738 00	1	3,989 75

Brewster,		-	e9	1	1	ı	353 60	1	1	1	1	1	419 79
Bridgewater,		٦.	69	1	53 71	53 71	1,695 89	1,830 26	25 03 1 452 32	34 37	488 81	623 18	1,782 85
Brimfield, .		-	8	1	1	1	263 08	1	1	1	1	1	257 58
Brockton, .			-	ı	ı	ı	2,000 00	1	1	1	1	1	2,000 00
Brookfield, .			8	1	1	1	615 24	1	1	1	ı	1	624 88
Brookline, .			-	1	ı	1	2,000 00	1	1	1	1	ı	2,000 00
Burlington,			8	623 85	477 79	1,101 64	389 37	. 935 93	205 75	546 56	931 15	1,477 71	406 64
Cambridge,			-	1	ı	1	2,000 00	ı	ł	,	387 45	1	5,000 00
Canton, .			7	1	1,468 66	1,085 83	2,735 52	2,753 19	590 401	1	2,299 96	1,689 97	2,815 38
Carlisle, .			က	1,855 10	430 94	2,286 04	264 21	1,839 48	462 90	1,575 27	495 79	2,071 06	242 66
Carver, .			60	258 99	2,630 03	2,789 02	847 94	6,236 40	1,503 65	4,888 46	1,463 12	5,851 58	857 25
Charlton, .			8	ı	1	1	572 31	ı	1	1	1	1	573 67
Chelmsford,			8	386 87	733 19	1,120 06	1,805 84	1,915 64	653 41	109 80	1,131 74	1,241 54	1,843 04
Chelsea, .			-	1	1	ı	2,000 00	1	1	1	1	ı	2,000 00
Chilmark, .			8	1	1	1	162 16	t	1	ı	1	1	168 42
Clinton, .			2	1	ı	1	3,788 36	1	1	1	128 00	1	3,822 20
Cohasset, .			67	1	ı	ı	3,950 36	5,806 85	2,854 22	1	2,433 42	602 92	3,952 08
Concord, .			63	1	528 23	407 08	3,810 94	3,346 78	269 851 396 12	'	482 40	14 59	4,145 07
Dana,			8	ł	1	ı	187 55	ı	1	ŧ	3	1	185 91
Danvers, .			5	ı	752 16	. 491 95	3,441 66	3,507 15	1,128 06	1	1,023 81	871 44	3,453 81
Dartmouth,			89	1	1	1	2,301 33	1	ı	1	ł	ı	2,472 37
Dedham, .			1	1	1	1	2,000 00	1	1	ı	866 39	1	2,000 00

1 Arsenate of lead sold.

			1915.				1916.	.6.			1917.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Deerfield,	က	ı	ı	t	\$1,060 71	1	ı	ı		1	1,101 28
Dennis,	co	1	ı	1	602 44	1	ı)	ł	8	\$620 02
Dighton,	89	ı	ı	t	693 15	ı	1	1	1	ě	754 62
Douglas,	00	1	1	1	534 02	ı	1	1	\$1 83	1	764 57
Dover,	ea	1	ŧ	1	3,309 97	1	1	1	00 00	1	3,662 23
Draeut,	က	\$500 00	\$734 64	\$1,234 64	1,035 82	\$1,659 88	\$776 03	\$624 06	664 67	\$1,288 73	1,060 90
Dudley,	က	1	ı	•	1,000 51	1	ı	ı	1	1	1,008 86
Dunstable,	က	649 81	192 53	842 34	170 28	860 11	261 11	689 83	468 27	1,158 10	284 99
Duxbury,	89	400 00	252 27	652 27	1,562 02	2,527 25	29 869	965 23	1,076 42	2,041 65	1,426 07
East Bridgewater,	က	ı	1	1	1,160 47	1	١	1	376 80	1	1,169 82
Easthampton,	64	1	1		3,139 59	109 46	ı	1	64 00	1	3,217 03
Easton,	61	1	ı	1	2,914 34	1	1	1	384 00	ı	3,049 75
Edgartown,	89	1	1	í	67 179	,	1		1	ě	610 35
Еввех,	89	420 77	40 17	460 94	530 31	839 91	182 97	309 60	146 74	456 34	538 51
Everett,	1	1	1	ı	2,000 00	1	1	ı	ł	ı	2,000 00
Fairhaven,	60	1	1	ı	1,800 64	1	1	ı	1	1	1,978 57
Fall River,	-	1	92 30	,	2,000 00	1	1	1	00 96	1	2,000 00

- 5,000 00	- 5,000 00	- 1,134 26	- 5,000 00	2,391 85	455 91	4,765 91	794 35 550 15	- 5,000 00	- 1,532 05	3,533 27	- 5,000 00	863 94 2,037 92	2 58 566 94	556 29 297 00	364 07 2,948 14	1,313 33 953 27	8 69 675 21	1,148 15 888 02	495 59 748 76	- 5,000 00	3,606 14
320 00	040 00		1	ı	1	77 55	638 70 79	767 54	19 71		00 96	762 76 86	243 64 432	543 74 55	795 62 36	684 88 1,31	848 68 1,638 69	902 11 1,14	110 84 49	,	1,122 75
-	1		1	1	1	1	155 65	1	1	ı	•	101 18	188 94	137 55	•	628 45	10 062	246 04	384 75	ı	- 1
1	t	1	t	1	1	1	703 15	1,369 15	210 00	1	1	353 77	{ 57 67 1 } 256 37 }	255 91	1,205 85	471 22	{ 25 76 1 505 32 }	\$ 543 861 \ 543 31 \	106 09	1	ı
1	ı	ı	ı	199 86	ı	1	706 56	4,220 46	543 85	1	1	1,939 27	743 46	540 17	2,336 32	1,543 64	1,533 21	1,062 94	1,111 81	1	1
2,000 00	2,000 00	1,126 45	2,000 00	2,026 00	458 11	4,617 46	550 91	2,000 00	1,530 30	4,156 91	2,000 00	1,838 09	554 52	277 62	2,676 86	915 19	618 20	816 90	727 06	2,000 00	3,494 86
ı	ı	1	ŧ	ı	1		1,033 33	226 03	ı	1	1	503 71	544 15	406 45	300 58	782 79	552 84	1,427 58	1	ı	1
1	1	1	1	1	ı	4	478 16	558 84	1 08	•	1	503 71	192 97	6 45	519 88	432 79	148 87	1,015 11	1	1	1
1	ı	1	1	1	1	ı	555 17	1	1	1	1	1	351 18	400 00	1	350 00	403 97	412 47	1	1	1
-	-	es	=	က	63	63	က	-	es	61	-	က	က	63	61	က	m	က	es	-	61
•	•	•	•	٠		•	•	•	•	•	•	٠	•		•	•	•	•		•	
		•	•	•	•	•	٠	•	٠		٠	•	•	•		•	٠	•		•	•
										n,											
Falmouth, .	Fitchburg, .	Foxborough,	Framingham,	Franklin, .	Freetown, .	Bardner, .	Georgetown,	Gloucester, .	Grafton, .	Great Barrington	reenfield, .	Groton, .	Groveland, .	Halifax,	Hamilton, .	Hanover, .	Hanson, .	Harvard, .	Harwich, .	Haverhill, .	Hingham, .

1 Arsenate of lead sold.

			1915.				1916.	.6.			1917.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Holbrook,	es	1	1	1	\$713 13	\$837 81	\$201 75	10	\$572 37	\$447 37	\$748 20
Holden,	60	\$1,125 85	\$175 08	\$1,300 93	764 10	1,251 27	272 32	\$487 17	146 38	633 55	805 27
Holliston,	62	1	1	1	858 93	t	1	1	143 08	ı	1,289 56
Hopedale,	63	1	1	1	3,567 90	ı	1	ı	1	1	3,507 84
Hopkinton,	es	ı	65 90	56 34	794 16	877 14	63 20	82 98	86 88	171 96	795 86
Hubbardston,	63	ı	1	ı	317 51	1	ı	1	1	1	322 27
Hudson,	69	1	526 35	526 35	1,712 32	1,891 75	802 76	179 43	628 33	92 208	1,752 91
Hull,	67	ı	1	1	3,688 76	1	1	1	1	ł	3,882 18
Ipswich,	60	ı	764 81	206 90	2,287 70	2,220 68	1,279 43	1	1,156 53	1,156 53	2,419 40
Kingston,	es .	440 84	262 64	703 48	682 48	885 03	323 22	302 55	392 58	595 13	09 269
Lakeville,	69	1	29 00	1	513 82	549 59	104 04	1	1,921 99	1,321 99	531 77
Lancaster,		ı	1	1	2,815 60	1	1	1	00 049	1	2,825 00
Lawrence,	-	1	1	1	2,000 00	1	1	1	1	ı	2,000 00
Leicester,	eo .	1	1	1	1,005 64	1	1	1	1	1	1,019 31
Lenox,		1	J	ı	3,390 83	ı	1	1	í	1	3,378 92
Leominster,	-	ı	1	1	2,000 00	1	ł	\$	384 00	1	2,000 00
Lexington,		800 00	1,310 21	1,847 17	4,011 27	5,813 22	$\left\{\begin{array}{cc} 1 & 60^{1} \\ 1,465 & 48 \end{array}\right]$	81 34	1,514 99	2,193 33	4,087 50

96 36	1,694 02	529 29	2,000 00	678 19	2,000 00	576 85	5,000 00	2,000 00	1,870 49	4,675 52	2,427 97	4,564 27	1,122 79	164 20	1,081 48	1,730 40	1,007 37	2,000 00	747 00	2,000 00	298 77
	1,828 12	1,002 44	940 26	1,332 13	1	1,818 59	201 67	ı	ı	1	ı	1,273 48	1,703 34	1,483 89	ı	1	1,175 50	ı	1	1	ı
'	1,965 19	805 51	1,880 52	919 15	1	734 01	256 00	251 50	73 80	00 96	1	830 67	1,384 21	408 96	1	228 90	2,067 69	256 00	166 05	1	1
1	1	} 196 93	1	} 412 98	1	1,084 58	373 67	ı	1	1	ı	641 28	444 13	1,074 93	1	1	ı	1	1	1	1
1	1,733 94	405 63 1 115 25	2,663 58	176 95 1	1	823 50	629 84	1	1	1	1	2,000 96	1,464 87	355 33	ı	1	905 73	t	1	1	1
	1,932 33	703 40	5,747 87	1,059 04	1	1,622 66	6,003 35	1	1	1	ı	5,284 18	1,689 71	1,343 43	1	1	679 40	1	1	1	1
98 67	2,069 40	506 47	5,000 00	646 06	2,000 00	538 08	2,000 00	5,000 00	1,809 21	4,584 16	2,252 33	4,522 88	1,120 58	143 50	938 57	1,670 16	971 59	5,000 00	733 08	5,000 00	296 92
1	1,446 44	658 39	1	1,085 60	1	1,577 60	1	1	1	1	1	1,481 04	451 83	1,361 43	1	1	1	1	1	1	ı
1	1,446 44 1,446 44	465 27 658 39	387 41	606 72 1,085 60	1	529 13 1,577 60	1	1	1	1	1	803 13 1,481 04	152 53 451 83	437 85 1,361 43	1	1	1	269 70	1	1	1
-		27	41		1		1	1	1	1 .	1		53		1	1	1	- 269 70 -	1	1	1
1		465 27	41	606 72	1	529 13	1	l l	1		1 - 2-5	803 13	30 152 53	58 437 85 1	1	1	1	1 - 269 70 -	1	1	1
1 = 6		465 27	41	606 72	1	529 13		1	1		3-2	803 13	30 152 53	58 437 85 1	1 1	1 1	1 1	. 1 - 269 70 -	1 1	1	1 1
1		465 27	41	606 72	1	529 13		1	1		1 3-5	803 13	30 152 53	58 437 85 1		1 1		1 - 269 70 -	1 1	1	1 1
		465 27	41	606 72	1	529 13		1	1		1 - 3-5	803 13	30 152 53	58 437 85 1		1	1 1		1 1	1	1
		465 27	41	606 72		529 13		1			3-2	803 13	30 152 53	58 437 85 1							1

1 Arsenate of lead sold.

			1915.				1916.	Ĝ.			1917.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Merrimac,	80	\$533 62	\$211 99	\$745 61	\$558 59	\$1,046 61	\$272 31	\$488 02	\$117 99	\$606 01	\$694 12
Methuen,	63	1	929 23	611 86	3,893 50	4,102 02	1,522 10	1	1,065 28	852 23	4,158 82
Middleborough,	က	998 42	1,075 64	2,074 06	1,984 82	5,169 07	982 99	2,934 25	1,927 51	4,611 76	2,082 34
Middleton,	က	750 00	227 22	977 20	369 60	1,088 11	221 38	718 51	474 21	1,192 72	383 89
Milford,	63	1	1	1	4,188 83	1	ŧ	1	1	1	4,222 93
Millbury,	က	ı	1 08	ı	1,359 65	1	1	1	26 33	1	1,336 42
, willis,	က	1	1	t	589 23	1	ı	1	268 80	ı	622 75
Milton,	-	1	1	1	2,000 00	6,224 92	5,370 74	ı	2,453 95	1,226 97	2,000 00
Monson,	က	1	1	1	791 36	1	1	1	1	1	800 53
Montague,	61	ı	1	1	2,401 59	1	1	ŀ	ł	1	3,055 50
Nahant,	63	1	1	ŧ	3,375 80	1	1	1	ı	1	3,556 01
Nantucket,	က	1	ı	ı	1,869 67	1	ı	1	ı	1	2,241 19
Natiok,	63	1	36 29	1	3,717 30	5,957 01	1,233 34	ı	66 17	1	3,801 28
Needbam,	61	1	1	1	3,604 35	2,531 19	2,500 32	2	2,395 15	09 269	3,915 13
New Bedford,	-	ı	1	1	5,000 00	ı	1	1	124 25	1	2,000 00
New Braintree,	es .	1	1	1	168 90	1	ı	1	1	t	172 77
New Salem,	69	1	1	1	159 18	ı	,	1	1	1	167 56

	714 65	00 000'9	2,000 00	478 39	2,452 22	3,744 14	802 89	415 60	838 64	2,326 80	681 27	540 92	2,000 00	821 11	149 10	1,632 86	2,346 06	854 07	2,287 93	172 87	2,000 00
	1,864 68	,	2,000 00	387 41	1,677 02	1	1	2,573 74	1,264 43	1	,	1,097 23	1	ı	1	ı	ı	1	1	1	1
	691 51	543 70	5,342 44	137 33	1,964 35	123 50	1	1,131 73	689 24	96	64 00	902 66	866 75	1	1	ı	1	ı	1	1	268 00
	873 17	4	2,000 00	250 08	ŧ	ı	1	1,442 01	61 229	1	1	194 57	1	1	ı	t	ı	ı	ı		1
	41 721 629 32	•	12,939 21	186 05	979 92	1	ŧ	544 13	481 55	1	1	582 11	1	ı	1	1	1	1	*	1	1
	1,340 78	1	20,064 40	718 62	2,998 75	1	1	1,839 33	1,231 48	,	1	748 44	1	1	1	1	1	ł	1	1	1
	19 299	2,000 00	6,000 00	468 54	2,416 82	3,825 19	818 23	397 32	795 29	2,296 00	670 72	553 87	6,000 00	22 008	154 44	1,612 17	1,932 24	843 57	2,147 86	168 60	2,000 00
=	1,416 72	1	2,186 48	389 64	670 46	1	1	2,020 06	1,062 86	1	1	69 296	1	1	1	1	40	ı	1	1	1
	665 87 1,416 72	1	4,372 97 2,186 48	89 64 389 64	677 07 670 46	1	1	820 06 2,020 06	429 91 1,062 86	1 08	1	69 29 69 69 69	1	1	1	1 80	40 40	1 08	1	1	1
_		1		75		1					1		1	1	1				1	1	1
-	665 87	1	4,372 97	89 64	20 229	1	1	820 06	429 91	1 08	1	69 29	1	1 1	1				1 1	1 1	1
	665 87	1	4,372 97	89 64	20 229		1	820 06	429 91	1 08	1	69 29	1	1 1	1 1				1 1	1 1	1
	665 87		4,372 97	89 64	20 229	1	1	820 06	429 91	1 08	1	69 29	1	1	1						
-	665 87	1	4,372 97	89 64	20 229		1	820 06	429 91	1 08	1	69 29	1	1	1				1	1	
	665 87		4,372 97	89 64				3 1,200 00 820 06	3 632 95 429 91	1 08	1	69 29	1	1 1							
	665 87	Newburyport, 1	4,372 97	89 64	20 229	North Attleborough, 2	1	820 06	429 91	1 08	1	69 29	Norwood,	Oak Bluffs, 3	Oakbam,						Peabody, ''

1 Arsenate of lead sold.

			1915.				1916.	6.			1917.
CITIES AND TOWNS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Pembroke,	ന	\$732 97	\$549 98	\$1,282 95	\$498 69	\$1,656 56	\$879 80	\$1,120 13	\$2,184 93	\$3,055 06	528 25
Pepperell,	က	551 62	572 47	1,124 09	942 18	1,778 71	649 38	836 53	503 26	1,339 79	\$978 77
Petersham,	က	1	1	1	416 26	1	1	1	1	1	468 73
Phillipston,	က	ı	1	1	122 27	1	1	1	ı	,	131 86
Plainville,	က	1	43 34	43 34	423 38	176 40	130 88	ı	66 33	1	428 75
Plymouth,	1	ı	ı	1	5,000 00	ı	1	1	1	1	2,000 00
Plympton,	က	1,097 31	225 49	1,322 80	186 21	1,741 33	10 00 1 114 00	1,430 12	520 10	1,825 22	188 57
Prescott,	က	1	1	1	1	ı	1	1	18 45	ŧ	86 81
Princeton,	က	1,822 63	387 33	2,209 96	20 992	2,299 53	178 00	1,733 48	345 96	2,079 44	902 84
Provincetown,	က	ı	ı	1	88 086	1	1	ı	1	1	1,111 97
Quincy,		1	1	1	2,000 00	6,323 70	1,519 80	1	2,319 61	00 009	2,000 00
Randolph,	က	1	1	1	1,266 86	1	1	1	118 60	'	1,176 00
Raynham,	ಣ	1	160 62	160 62	396 38	390 46	137 72	1	157 53	151 61	402 67
Reading,	67	ı	1,418 15	209 81	3,162 20	3,074 98	2,118 00	1	1,649 08	1,249 47	3,327 59
Rehoboth,	က	1	1	1	428 10	1	1	1	148 18	ı	432 90
Revere,	-	1	1	ı	2,000 00	ı	1	ı	00 96	1	2,000 00
Rochester,	67	1	1	1	420 63	1	1	1	,	1	425 37

2,211 25	1,672 14	924 43	303 60	371 92	6,000 00	717 00	622 00	2,932 90	2,422 83	839 81	1,578 09	1,009 04	544 24	1,338 49	753 53	2,000 00	1,430 06	985 64	1,462 28	2,000 00	559 38
ı	ı	736 31	1	ı	ı	925 95	104 63	342 19	2,339 80	!	ı	803 81	545 74	1	ı	ı	1	818 87	ı	ı	61 119
369 00	246 25	755 81	6 40	ł	ě	218 00	93 14	720 33	1,431 97	1	38 40	900 14	552 40	113 59	164 00	1	32 00	450 98	1	1	352 75
1	1	1	1	ı	1	407 95	11 49	•	88 206	1	1	ı	1	ı	1	1	ı	367 89	1	1	258 44
1	1	784 82	1	1	1	406 76	116 00	1,856 60	1,916 52	1	ı	890 28	147 07 1	372 75	ı	1	ı	628 68	1	ı	149 75
	1	800 16	ł	1	1	1,091 71	621 63	2,742 37	3,283 41	ŝ	ş	862 82	859 97	558 25	1	1	1	1,313 80	1	1	806 47
2,191 96	1,634 04	819 66	299 06	377 27	2,000 00	683 78	610 14	2,855 15	2,375 58	750 31	1,598 84	959 15	555 13	1,191 35	735 12	2,000 00	1	945 91	1,451 60	2,000 00	548 03
1,131 13	ł	517 96	1	1	1	1,015 42	631 94	520 17	1,995 42	ı	ı	472 25	275 09	ı	ı	1	1	775 33	1	1	364_01
1,731 13	1	.525 37	1	1	. 1	488 32	381 94	592 89	895 42	1	1	372 25	298 26	98 30	1	1	1	375 33	1	1	326 75
1	1	t	1	1	1	527 10	250 00	219 44	1,100 00	1	1	100 00	1	1	1	ŧ	1	400 00	ı	1	37 26
=																					
ಣ	က	က	00	က	1	က	က	63	3-2	က	ಣ	ಣ	က	ಣ	ಣ	-	ಣ	က	က	-	ಣ
•		•				•	•						**	•					•		
		٠																			
	٠	•	٠	٠	٠						٠						٠	٠			
Rockland, .	Rockport, .	Rowley, .	Royalston, .	Rutland, .	Salem, .	Salisbury, .	Sandwich, .	Saugus, .	Scituate, .	Seekonk, .	Sharon, .	Sherborn, .	Shirley, .	Shrewsbury,	Somerset, .	Somerville, .	South Hadley,	Southborough,	Spencer, .	Springfield,	Sterling, .

¹ Arsenate of lead sold.

				1915.				1916.	9			1917.
CITIES AND TOWNS.		Славв.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expenditure.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Stockbridge,	•	က	ı	1	1	\$1,807 00	ı	ı	1	e e	1	\$1,828 02
Stoneham,		63	\$200 00	\$881 32	\$1,081 32	2,438 34	\$2,438 18	\$1,410 17	ı	\$955 89	\$764 59	2,499 86
Stoughton,	•	က	1	231 57	170 64	1,740 18	1,826 37	369 89	1	981 67	645 48	1,925 92
Stow.	••	ත	416 52	677 21	1,093 73	19 069	1,135 59	249 37 1 299 68	\$544 98	779 32	1,324 30	464 29
Sturbridge,	•	က	1	1	1	382 04	í	1	1	1	1	382 53
Sudbury, .	•	ಣ	530 58	791 36	1,321 94	646 39	715 40	783 98	10 69	1,016 20	1,085 21	672 37
Sutton,	•	63	1	1	1	619 97	ı	1	1	1 79	ı	618 76
Swampscott, .	•	#	1	1	1	5,000 00	1	1	1	295 20	\$	2,000 00
Swansea, .	•	က	1	'	ı	780 74	ı	ı	ı	ı	1	810 01
Taunton,	•	-	1	1	1	2,000 00	ı	i	1	348 25	1	2,000 00
Templeton,	•	က	64 41	122 93	187 34	810 03	1,067 08	447 76	132 05	502 08	634 13	819 06
Tewksbury, .		ಣ	896 33	709 32	1,605 65	744 71	1,452 54	426 92	707 83	166 10	1,473 93	988 44
Tisbury,	•	က	1	1	ı	863 41	1	1	1	1	1	970 27
Topsfield,	•	က	27 60	230 06	287 66	1,717 93	1,685 82	761 90	1	471 37	439 26	2,071 56
Townsend,	•	က	400 00	350 01	750 01	578 13	983 14	442 63	405 01	627 59	1,032 60	585 99
Truro,	•	က	ì	147 54	147 54	207 68	176 16	14 00	1	16 69	45 17	220 42
Tyngsborough,	-	က	1,450 00	757 90	2,207 90	301 37	1,804 31	675 18	1,502 94	918 46	2,421 40	334 41

•	60	1	1 08	1	523 00	1		1	1	1	524 31
60		1	1 08	1	1,744 11	1	1	1	1	,	1,851 64
2-1		1	456 63	1	4,981 12	ı	1	1	546 92	1	2,000 00
2		1	,	1	3,014 00	ı	ı	1	218 15	1	3,064 53
1		1	2,614 62	1,190 32	2,000 00	8,439 31	2,350 34	1	1,774 36	1	2,000 00
က		1	1	ı	2,210 80	1	ı	1	ı	ı	2,178 37
2		ı	ı	1	2,672 06	1	1	ı	256 54	ı	2,601 86
က		1	1	1	1,066 75	1	ı	1	128 00	ı	1,088 89
တ	-	1	ı	1	182 11	1	1	1	1	ı	188 23
_		1	ı	ı	2,000 00	ı	1	1	115 20	1	2,000 00
က		ı	1,010 23	1,010 23	1,207 28	926 12	(644 55 ¹ 762 19	, , ,	1,301 75	1,020 59	1,358 76
2		1	ı	1	3,606 32	1	1	ı	1	ı	3,685 51
		1	1	1	2,000 00	1	ı	ı	129 15	1	2,000 00
8		1	1	ı	342 76	1	ı	ı	2 11	ı	340 51
63		1	1	1	219 73	1	ı	1	1	ı	223 88
89		1	705 21	614 42	1,464 86	1,423 76	357 48	ı	548 54	507 44	1,465 94
ಣ		390 64	96 899	1,059 60	411 84	98 699	244 02	258 02	169 28	427 30	449 45
က		00 009	402 45	1,002 45	750 03	1,749 81	309 16	82 666	442 24	1,442 02	803 76
ಣ		ī	1,578 35	939 91	446 39	427 37	118 491	1	355 97	336 95	454 71
က		1	1	1	265 42	1	l	4	1	1	256 81
က		1	189 17	149 36	1,337 09	1,611 75	554 32	274 66	224 63	499 29	1,327 68
60		833 02	914 07	1,747 09	970 43	1,564 76	386 76	594 33	1,120 77	1,715 10	991 20

1 Arsenate of lead sold.

				1915.				1916.	6.			1917.
CITIES AND TOWNS.	SS.	Class.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Westminster,		60	\$1,196 70	\$105 41	\$1,302 11	\$401.17	\$1,326 48	\$168 21	\$925 31	\$126 17	\$1,051 48	\$405 24
		. 2-1	1	1,862 87	931 43	3,484 34	4,023 48	2,760 00	1	3,974 01	2,819 21	5,000 00
		en .	ı	1	1	982 63	1	1	ı	ŧ	1	1,063 72
Westwood,		m	1	1	F	1,804 62	î	1	ı	640 00	1	2,370 23
Weymouth,		-	ī	ı	1	2,000 00	1	ı	1	1,495 20	ı	2,000 00
		es	1	i	ı	303 93	ı	ı	1	1	ı	301 28
Whitman,			ı	i	1	2,303 84	1	1	ı	1	1	2,465 83
Wilmington,		67	950 00	871 13	1,821 13	843 89	2,062 12	827 04	1,261 15	1,070 41	2,331 56	875 87
Winchendon,		m	278 65	331 69	610 34	1,778 80	2,540 89	247 95	762 09	319 48	1,081 57	1,787 01
Winchester,		-	1	ı	ı	2,000 00	1	1	1	1	1	2,000 00
Winthrop,	٠	-	ı	1	1	5,000 00	4	1	1	76 80	1	2,000 00
			1	219 29	1	2,000 00	1	1	ı	639 63	1	2,000 00
Worcester,		. 1	1	1,453 86	726 93	2,000 00	5,259 64	1,200 76	1	1,036 92	ı	2,000 00
Wrentham,		8	1	1	ı	642 18	1	1	ı	1	,	660 53
Yarmouth,		65	ı	ı	1	1,023 11	ı	1	ı	ı	1	1,025 43

¹ Arsenate of lead sold.

REPORT OF THE STATE FORESTER ON THE RESOLVE AUTHOR-IZING HIM TO ASSIST IN THE CUTTING AND DISPOSING OF MERCHANTABLE TIMBER ON LANDS ON AND ADJACENT TO MOUNT GRACE IN THE TOWN OF WARWICK.

To the General Court.

In regard to the aid and assistance to owners of property on Mount Grace and adjacent property as directed by the General Court in the following resolve:—

CHAPTER 129.

Resolved, That the state forester is hereby authorized and directed to assist, upon request, subject to the terms and conditions of section two of chapter four hundred and nine of the acts of the year nineteen hundred and four, owners of land on or adjacent to Mount Grace in the town of Warwick, upon which there is merchantable timber, in the cutting and disposing of the timber thereon, by recommending the use of modern forestry principles and methods pertaining thereto. The state forester is further directed to estimate the value of the timber cut on the lands on and adjacent to Mount Grace during the current year and to report thereon to the next general court not later than the second Wednesday in January. [Approved May 23, 1916.

I respectfully state that this investigation has been made and is herewith reported upon. Mr. Frank L. Haynes, the forest engineer, who made the investigation and survey for last year's report, has again furnished the data upon which the following is based.

In accordance with the provisions of the legislative resolve calling for further investigation of the Mount Grace area and lands adjacent thereto, and in compliance with your instructions for a report covering the execution of the provisions of the legislative resolve, the following is submitted.

Investigation of Mount Grace and areas adjacent thereto and information received from timberland owners in that vicinity indicate that no cutting of consequence has been undertaken during the period between May 23, 1916, and Dec. 19, 1916. That no operating has been carried on is probably due to the fact that it has been almost impossible during the past season to secure enough woodsmen to carry on a lumbering operation in this section of any material size. No requests have been received from the Mount Grace timberland owners asking for assistance in the management of their holdings in keeping with modern forestry principles, and inasmuch as no timber is known to have been cut, it is impossible to carry out the provisions of the legislative resolve calling for an estimate of the timber cut. The entire Mount Grace matter stands as it did at the time the last report on the project was submitted, reference to which may be had.

Respectfully submitted, F. W. RANE, State Forester. REPORT OF THE STATE FORESTER ON THE RESOLVE PROVIDING FOR A FURTHER INVESTIGATION RELATIVE TO THE ADVISABILITY OF TAKING MOUNT HOLYOKE AS A STATE RESERVATION.

To the General Court.

In the matter of the investigation for further information relative to a State reservation being made of Mount Holyoke, as directed by the General Court in the following resolve:—

CHAPTER 145.

Resolved, That the state forester is hereby authorized and directed to investigate further as to the advisability of acquiring Mount Holyoke in the towns of Hadley and South Hadley as a state reservation. He is also directed to ascertain, so far as possible, what proportion of the citizens of the commonwealth would be benefited by the said acquisition, and the probable number of people who will visit the mountain during the present year, and to gather such other information as will enable the general court to determine the wisdom of acquiring the mountain, and to report to the next general court not later than the second Wednesday in January. [Approved May 24, 1916.

I respectfully state that this investigation has been made and is herewith reported upon. The State Forester made two trips to the mountain and also made arrangements for securing data through Mr. John A. Rowell, the proprietor of the Mountain House, and for further assistance through Mr. Frank L. Haynes, an assistant forester in the State's service, who made the original survey and report submitted last year to the General Court.

MOUNT HOLYOKE LANDS.

In the report on the Mount Holyoke Reservation submitted to the Legislature last year it was recommended that the several thousand feet of standing chestnut be cut as soon as possible on account of its being infested by the chestnut bark disease. Preparations are being made for the cutting and removal of this chestnut during the winter of 1916–17. The removal of this standing chestnut, estimated to total 500,000 board feet, will not materially decrease the value of the tree growth on the mountain as a whole, owing to the fact that most of the chestnut is in a dead or dying condition and would, unless cut and utilized soon, be without a value in itself. Also on account of the chestnut being scattered in amongst other hardwood trees, its removal will not leave the area from which it is cut in an entirely open or bare condition and of less value for park purposes.

USE OF THE MOUNTAIN.

The legislative resolve asks for an estimate of what proportion of the citizens of the Commonwealth would be benefited by the acquisition of the reservation by the State. It is rather difficult to form even an ap-

proximate estimate. It appears reasonable to state that the major part of the visitors to Mount Holyoke are those citizens of the State living in that portion of the thickly settled Connecticut River valley from which the mountain is the most readily accessible, but there are also hundreds of people visiting the mountain each year who come from nearly all parts of this and other States.

VISITORS YEARLY.

As to the number of people visiting the mountain each year, the following figures furnished by Mr. Rowell, manager of the hotel on Mount Holyoke, may be of interest. During the seasons of 1914, 1915 and 1916, 15,213 guests were registered at the Mountain House, as follows: 1914, 4,100 guests; 1915, 5,576; 1916 (up to October 1), 5,537.

The accessibility of Mount Holyoke for automobilists, made possible by the excellent road running to the summit, is shown by the fact that approximately 2,800 automobiles have been to the top of the mountain during the past three seasons. Most of the travel to the mountain occurs on Sundays and holidays, on which days about 200 people and 30 to 50 automobiles are recorded.

Further investigation of the Mount Holyoke Reservation proposition has not brought forth additional data or information having a tendency to change the status of the matter as a whole over the report submitted to the last Legislature, reference to which may be had. (See the twelfth annual report of the Massachusetts State Forester, pages 113 to 122, or the last year's Mount Holyoke bill.)

Respectfully submitted,

F. W. RANE, State Forester.

DEC. 23, 1916.

REPORT OF THE STATE FORESTER ON THE RESOLVE AUTHOR-12ING HIM TO ASSIST IN THE CUTTING AND DISPOSING OF MERCHANTABLE TIMBER ON LANDS ON AND ADJACENT TO THE MOHAWK TRAIL.

To the General Court.

In regard to aid and assistance to owners of property along the Mohawk Trail as directed by the General Court in the following resolve: —

CHAPTER 147.

Resolved, That the state forester is hereby authorized and directed to assist, upon request, subject to the terms and conditions of section two of chapter four hundred and nine of the acts of the year nineteen hundred and four, owners of land on or adjacent to the Mohawk trail, so-called, in Berkshire and Franklin counties, upon which there is merchantable timber, in the cutting and disposing of the said timber by recommending the use of modern forestry principles and methods pertaining thereto. The state forester is further directed to estimate the value of the timber cut on the said lands during the current year, and report thereon to the next general court not later than the second Wednesday in January. [Approved May 26, 1916.

I respectfully state that this investigation has been made and is herewith reported upon. The State Forester has made several trips over the Mohawk Trail during the year, but has depended upon Mr. Frank L. Haynes, the forest engineer, who made the original report last year, to investigate the conditions and furnish the available data upon which the following is based.

During the period of time between May 26, 1916, the date on which the above legislative resolve was approved, and the present, there have been no requests from landowners in the vicinity of the Mohawk Trail for assistance in managing their woodland holdings along forestry lines. Inspection of the immediate Mohawk Trail areas and information secured from some of the owners themselves indicate that no cutting of material consequence has been carried on during the past seven months. This condition of affairs is to a considerable extent both fortunate and unusual. and can be accounted for as follows. It has been extremely difficult for woodland owners desiring to operate their holdings to secure sufficient woodsmen to carry on their cutting and hauling. This condition of affairs has obtained in all parts of the State, the Mohawk Trail section being no exception. Also during the past season the woodworking plant located at Charlemont was destroyed by fire, thereby eliminating for one season a mill which ordinarily utilized a large proportion of the wood cut on lands immediately bordering the trail itself. This mill is being rebuilt, and, should woodsmen be available another season, it appears reasonable to believe that the trail woodlands will be cut into, and possibly in such a manner and to such an extent that the natural beauty of the lower trail scenery will be seriously disturbed for a considerable period of time. This is true for the reason that the birch, and especially the white birch, which adds so materially to the natural beauty of the trail in all seasons, is the tree in greatest demand for woodworking purposes in that immediate vicinity. There has been a small amount of cutting done during the past season, but the amount and value are not of sufficient magnitude to consider. On the whole, the Mohawk Trail lands matter stands as it did at the time the last report was submitted to the Legislature, reference to which may be had.

Respectfully submitted,

DEC. 23, 1916.

F. W. RANE, State Forester.

MEETINGS AND ADDRESSES.

The department is called upon each year for talks and addresses before various organizations. We endeavor to do as much of this kind of work as seems consistent with accomplishing best results. The following organizations and meetings were attended the past year:—

Worcester County Farm League, Worcester.

Boston Market Gardeners Association. Topsfield Grange and Citizens Club.

Marshfield Agricultural Society.

Wellesley Club.

Northampton Board of Trade.

Newton Technical High School.

Elliott Church Men's Club, Lowell.

Meeting of local moth superintendents, Boston.

Tree Wardens and Foresters Association, Boston.

Boston Public Library course.

Conservation Commission, Washing-

Forest Owners Club, Tuxedo Park, N. Y.

Massachusetts Forestry Association, Springfield.

West Medway Grange.

Cornell University, "Massachusetts Forest Policy."

Society for the Protection of New Hampshire Forests, Crawfords, N. H. Southeastern Agricultural Society, Lin-

coln Park, Westport.

Harvard Grange.

Amesbury and Salisbury Agricultural
Society.

Hampden County Improvement League.

Massachusetts State Grange.

Weeks Law Co-operative Forest Fire Conference, Boston.

Forest Fire Wardens' conferences at Pittsfield, Greenfield, Springfield, Worcester, Fitchburg, Lawrence, Middleborough and Boston.

Fire Chiefs Club, Springfield.

Hingham Fire Department.

Massachusetts State Board of Agriculture, Boston.

Middlefield Agricultural Society.

Society for the Promotion of Agricultural Science, Washington, D. C.

Cape Cod Cranberry Growers Association, Wareham.

Citizens' meeting, Warwick.

Dracut Grange.

Sudbury Women's Club and Grange.

Needham Board of Trade.

Wollaston Improvement Association.

Opening of town forest, Walpole.

Old home day, Carver.

Hingham Agricultural Society.

Alpha Club, Blackstone.

Public meeting, Northborough.

Waverley Improvement Association.

Rockland Grange.

Hubbardston Men's Club.

Hanson Grange.

Uxbridge High School Alumni Association.

Old Baptist Brotherhood, Cambridge.

Convention of Eastern Foresters Association.

Entomological conference under auspices of United States Department of Agriculture.

Marshfield Grange.

Farmers' week, Massachusetts Agricultural College.

Boston Lumber Trade Club.

The following address was delivered by the State Forester at Washington, D. C., before the thirty-seventh annual meeting of the Society for the Promotion of Agricultural Science on Nov. 14, 1916:—

FOREST DEPREDATION AND UTILIZATION.

It is hardly necessary to emphasize to an American the fact that forests are primarily used in our industries, for we have been only too cognizant of the truth of this statement from resultant conditions.

Without going into the discussion of wasteful and deplorable forest methods, it is the purpose of this paper to point out wherein practical forestry may aid in the solution of many perplexing forest problems.

By forest depredations we include a very large number of troubles, the more important of which are damage to forests from fire, disease, insects, wind and animals.

In a comparatively new country like ours where practically no attention was given to future conditions, and where due consideration is gained only by severe experience, we awaken to find many disastrous things have been done which now must be rectified.

The problems now are many and complicated, and they could have been avoided with comparatively little effort, if we had had our present knowledge.

In forest troubles coming from insects and diseases, we are finding, as was the case in the fruit-growing industry, our greater troubles come from introduced or so-called foreign insects and diseases brought to us usually on imported stock. Steps have been taken to regulate future importations through careful inspections and powers of restriction, but this is of little use in overcoming and neutralizing the depredations of those already established.

It is these insects and diseases that are causing us a great amount of trouble. To cope with these unwelcome guests has proven in many cases extremely troublesome and expensive.

The writer has had much experience with forest depredations, and the results secured through a careful study of utilization as a practical aid in the solution of a few of our forest troubles in Massachusetts seem very encouraging.

This probably explains why the secretary of this society has asked the writer to discuss at this time, first, the latest developments in the work of suppression of the gypsy and brown-tail moths in Massachusetts, and, second, the present status of the chestnut blight and the blister rust diseases of more recent years.

In order to succeed in aiding the woodland owner in our State in his fight against the invasion of his forest growth by pests, a very careful and complete survey of the whole question of markets, materials, labor costs, cost of teaming, transportation charges, milling expenses, supervision, etc., was made in order to utilize all dormant capital possible, which

otherwise would be almost a total loss. This study has proved worth the effort, as not only have we been able to make the sale of forest products self-supporting, but in many cases a substantial net revenue has been secured.

For a number of years the gypsy and brown-tail moth work was confined largely to shade trees and orchards, and the work of combating and suppressing these insects was directed towards overcoming the great loss following their ravages measured largely in asthetic values.

As was inevitable, although the very best brains of the nation assisted by experts from abroad were focussed upon the suppression of these insects, the spread continued throughout the forests of the eastern part of the State. As these insects became intrenched in our woodlands, which are composed of a great variety ranging from valueless scrub and brush growth to superior stands, the same methods practiced upon preservation of trees in cities and towns were prohibitive on account of the great expense entailed. It was found that to spray an acre of woodland of average conditions with arsenate of lead, for example, would cost \$40, while the assessed value of the whole property might not average that amount.

Anticipating these conditions, the Massachusetts State Forester set at work to meet the situation, and in a year's time evolved a spraying machine that revolutionized all previous methods. This machine was constructed of parts made of bronze metal instead of cast iron and perfected in such a way as to obtain greater efficiency in spraying and at the same time reduce the expense of operation. The result of this improvement in our spraying equipment was to lower the comparative cost of woodland spraying from \$40 to \$6 per acre. In accomplishing this result, the State Forester desires to acknowledge the assistance of L. H Worthley and Melvin Guptill. The former was an assistant in the department in charge of moth work and the latter was responsible for executing the engineering work. This powerful machine, making possible the spraying of tall trees without climbing, is economical of team and manual labor. No patents were ever applied for and the results were given to the world. This machine has been in common use in Massachusetts and elsewhere, and, aside from the natural improvements suggested from experience and minor inventions each year, is the same machine.

Other methods of moth suppression besides spraying have been used, such as introducing parasites, creosoting egg masses, etc., all of which are of value when used intelligently, but spraying is commonly resorted to when immediate results are desired. During the past season the contract for arsenate of lead by the State Forester was for 700 tons, and it is believed that 1,000 tons may have been used in Massachusetts.

As soon as the moths began to make inroads into the forests, we were confronted not only with improving and perfecting our spraying methods but other economic measures suggested themselves.

It was found to be a poor policy to spray good, bad and indifferent trees alike. It naturally followed, therefore, that the undesirable ones were taken out, thus enabling the remaining trees to be sprayed more economically.

Herein lies the main thought of this discussion, the point to be emphasized, namely, forest utilization in connection with depredations.

The chief purpose of the forester is to bring order and system out of chaos, and meanwhile to determine ways and means of reducing our methods to scientific and economic practice.

Upon studying the moth situation from the broad standpoint of future results when applied to forest conditions, the correct method of procedure was self-evident. As already indicated, it was an advantage to thin the forests to accomplish better spraying, and this practice naturally fell to the trained forester.

As soon as modern forestry practices were applied and sylvicultural studies made, better results followed. It was soon demonstrated that certain trees were the natural food of the moths while others were to a greater or lesser extent immune from their attack, and particularly so when in so-called clear stands or in mixtures with other species equally undesirable as moth food.

Taking advantage of these fundamentals and encouraged by actual results from the field experience, the so-called forestry methods of moth control have rapidly come to the front. During the past few years the State Forester has executed some large forest operations which have not only proven satisfactory in handling the moths, but from the economic standpoint have aided in establishing better forestry practices. The result from moth invasion in woodlands was to throw upon the market an oversupply of dead and dying forest products.

The forests of eastern Massachusetts are the remains of a culled-out and cut-over country which has restocked itself without regulation or future concern. All sorts of forest types, species, mixtures, ages and conditions are found.

When the moths invade these woodlands they readily find enough of such species as they prefer to live upon until they are fairly grown, and then, if compelled to do so, they finish their feeding period on whatever remains for them to devour.

Taking advantage of this fact, we have inaugurated the practice of taking out those species upon which the insects thrive best, their so-called natural food trees, with the result that the conditions are unhealthy for their propagation. The evergreens, the white pine in particular, one of our most valued species, we find are practically immune from the gypsy moth when grown in clear stands, for the reason that the very young caterpillars are unable to eat the needles. Hence, if there are no deciduous trees present upon which they may feed during their earlier stages of existence, the pine is unmolested. Had this fact alone been known earlier in the moth suppression work, great areas of white pine could have been saved. Our present treatment, therefore, with white pine stands is simply to thin out the growth upon which the gypsy moth naturally feeds, such as oak and gray birch, and the stand is thereafter self-protecting.

To work out a policy whereby all of the various conditions and methods

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could be made to harmonize and still accomplish results has been no small undertaking.

The earlier moth work entailed great expense and this in itself rendered it unpopular. The constant aim at present is to conduct the work along self-supporting lines as far as possible. In forestry methods of moth control, estimates of costs are made and the forest products practically sold before the operation is begun. The State Forester and his assistants supervise the work, let contracts for the milling, chopping, hauling, etc., but the owner advances the funds for the undertaking.

During the past three years approximately 45,000 cords of wood and between 7,000,000 and 8,000,000 feet of lumber have been operated under this plan.

Every time an operation of this sort is properly done, it is not only an example of good moth-suppression work, but a beginning of better forestry practice; the territory for future infestation is lessened by just that much, and, best of all, it is self-supporting. Any one can spend money in this work, but it takes men with experience and ability to break even or, still better, return a profit to the owner.

To find a market, or utilization alone, has been a perplexing problem. It has been necessary actually to create a market for our products. The wood-using industries had well-established sources of supply, and many ingenious plans were attempted before the trade could be interested. Three years ago, under very unfavorable markets, the work was made a success, and since the European war, of course, the only difficulty to surmount is that of getting efficient labor. The demand for forest products is far beyond our ability to supply.

Word has been sent out recently from the Massachusetts State Forester, through his local town officials and by means of the press, to all farmers and woodland owners, emphasizing the fact that this year offers exceptional opportunities for doing splendid constructive forestry work. The price of coal is very high, and, should present conditions continue, even more direful need for fuel may exist another season. At any rate everything is favorable for the better solving of our moth troubles and establishing permanent forestry conditions.

This whole subject is discussed more fully in the publications of the Massachusetts State Forester, which are available to those interested. I trust I have pointed out that utilization, particularly in our fight in the moth-control work in Massachusetts, has been a very practical method of attack. This work will necessarily need to be continued for years.

If the gypsy and brown-tail moths have done nothing else, they have driven us to a stern realization that we need to practice more and better methods of forestry management if we are to get best results.

Chestnut Blight.

The disease known as the chestnut blight has swept over the north-eastern part of the United States, and apparently stands ready to annihilate the chestnut tree in this section. It is common to Massachusetts generally, although in some sections of the State conditions are worse than in others. As the disease is communicable from tree to tree and is very virulent, the outcome is entirely problematic.

As is the case with moth work, Massachusetts is giving all possible aid to chestnut tree owners in utilization of their products, and at the same time is determining upon some forestry policy for the cut-over land. Where the chestnut is in mixtures of pine, the pine is retained with the idea of supplanting the chestnut growth with this species. Chestnut poles, ties and saw timber are all in demand at good prices; hence conditions are very favorable for owners to realize on this crop.

White Pine Blister Rust.

This disease has been introduced into this country on nursery stock of either the white pine or other five-leaved pines, or on the currants and gooseberries, the plants belonging to the genus *Ribes*.

Unlike the chestnut bark disease it does not spread from pine to pine, but must alternate from pine to Ribes to complete its life cycle.

The disease is common in Europe and was found in New York State on imported stock several years ago. At that time, upon the invitation of Mr. J. S. Whipple, then forest, fish and game commissioner of New York, a conference of officials from various States and the government met at Albany and later in New York city, where the whole matter was fully discussed. The result of these meetings was to cease importing foreign white pine stock, rigidly inspect all future imports, grow our own stock in this country, and practice a close inspection of all foreign stock already planted here with a view to destroying it should the disease appear.

Recognizing the importance of having an inspection of the foreign stock already planted in Massachusetts, the State Forester had an official representative of the Bureau of Plant Industry of the United States Department of Agriculture visit our plantations and advise us regarding them in 1911.

Last year the disease was found on two of our large private estates, one in the eastern or North Shore section, and the other in the western or popular Berkshire country. Upon finding these outbreaks, interest was aroused in determining more fully the conditions elsewhere. It was found that the currants proved a good index for determining the presence of the disease, and an inspection over a considerable portion of the State showed its presence. Believing it of sufficient importance to make even further investigation in order to determine more fully to just what extent the disease may be found and to eradicate its evils, the State appropriated \$10,000 for use the past season. The United States Congress also appropriated \$50,000 for similar use throughout the Nation.

Scouting investigations have continued throughout the year and practically the whole State of Massachusetts has been covered. It is understood that the disease is found very generally distributed over the State, being, however, more commonly found in some sections than in others.

White pines are far less affected than are currants, but here and there the pines are found with the disease. In no case, as far as the writer is aware, is there an infection of sufficient magnitude to destroy a stand of white pine of any appreciable size. Here and there, where the disease has been present for a period of years, a few fairly good sized trees, ranging up to 12 inches in diameter, contained more or less blister rust cankers on their branches and some upon the upper main trunk. In most cases here, however, the trees themselves were growing in abnormal conditions and were equally unhealthy from an unfavorable environment, and were infested with all the other disease and insect enemies common to their kind.

In plantations of imported stock the disease is likely to be found, and in our younger plantations, if the disease is present, it is in all likelihood accounted for in this way. Plantations of native stock are practically free from the disease. There is a possible danger, however, from these native plantations having been filled in with foreign stock, which might account for some infestations.

Our Massachusetts plantations of foreign stock have been gone over each year, and the infected trees have been pulled and burned. This practice, now running over a period of six years, has resulted in less and less infected trees each year, and at no time has the percentage of trees affected been as large as 1 per cent.

With our present knowledge of the subject, what remains for us to do in the future? The writer is frank to say that it is his belief that more harm than good has been done by the unnecessary agitation in the publicity campaign so systematically carried on at great expense, exciting people over a subject about which enough is not yet known even by experts themselves. It is a very easy matter to tear down, but quite another to build up and accomplish something. For the past ten years we have been working hard in Massachusetts to encourage better forestry practices, and reforestation, particularly with white pine, has just gotten under headway. Our people are interested and enthusiastically co-operating. We have millions of trees in our nurseries ready to go out, and all at once under the guise of public-spirited co-operation, and before there has been sufficient evidence, a campaign is set in motion to discourage and thwart all our laudable reforestation endeavors.

Realizing that the blister rust disease needs attention, and believing that it could be properly safeguarded by those who are made responsible for so doing, last year the following recommendation was made in the State Forester's annual report, and it is believed it will bear repeating now, as follows:—

The white pine blister rust, one of the diseases of the white pine, should be given due consideration at the hands of our various State officials, particularly the pathologist of the Agricultural Experiment Station and the State Nursery Inspector, in determining our conditions as regards this disease. Some definite policy of holding the disease in check, or exterminating it if possible, should be arrived at. It is believed that while this disease may become very destructive to our white pines, nevertheless the danger is not sufficient to discourage prospective planters of the white pine. It is not our purpose to minimize the importance of this disease, nor do we intend to lessen our endeavor to combat it. We do, however, believe it is a good policy not to overexaggerate the question, and thus necessarily deter the constructive work of reforestation, until there is more convincing proof than is to be had at present that the disease is likely to become a great menace to white pine. It is to be hoped that the average Massachusetts citizen will go ahead planting white pine as enthusiastically as ever, leaving the problem of its protection from diseases and insects to be looked after by technically trained officials.

We certainly have not sufficient knowledge at the present time to determine how serious a menace confronts us in this disease. Investigation and experience will have to serve as a guide to future operations.

From a more or less careful study of conditions my personal recommendations in handling this disease for this coming year would be as follows:—

1. Empower a State department with authority to regulate and control any and all diseased white pines and *Ribes* (currants and gooseberries), declaring them a public nuisance and to be dealt with in a similar manner to that in which gypsy moths are now controlled.

2. That a sufficient appropriation be made for carrying the work on as the exigencies of the occasion demand from year to year.

Results are what is desired, and the sooner this disease is gotten in hand the better. Meanwhile optimism rather than pessimism will the better aid in solving our forestry problems. Where there is a will there is a way, and Massachusetts does not concede for one minute that we are going to lose our white pines, from any diagnosis that her State Forester, at least, can make thus far.



An example of where a young white pine tree lost its leader, due to the pine weevil, and in two years' time one of the lateral branches had assumed the position shown in this photograph. The last season's growth measured 42 inches. This demonstrates how a tree may outgrow its injury.



LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.
[Alphabetically by towns and cities.]

TELEPHONE	Forest Warden.	T	Local Moth	Div.
Number.	Forest warden.	Town or City.	Superintendent.	No.
157-W, Rockland,	Sumner L. Deane,	Abington,	C. F. Shaw,	7
71-4,	Wm. H. Kingsley,	Acton,	J. O'Neil,	4
2003-M,	Henry F. Taber,	Acushnet,	A. P. R. Gilmore,	8
201, Kippers, .	John Clancy,	Adams,	John Clancy, .	5
1431-M,	E. M. Hitchcock,	Agawam,	E. M. Hitchcock, .	5
161-6, Great Bar-	W. F. Milligan,	Alford,		-
rington. 179-M,	Jas. E. Feltham,	Amesbury,	A. L. Stover, .	3
541-M,	A. F. Bardwell,	Amherst,	W. H. Smith, .	5
324-M,	Chas. S. Buchan,	Andover,	J. H. Playdon, .	3
35 or 206,	Walter H. Pierce,	Arlington,	Daniel M. Daley, .	1
2-12,	John T. Withington, .	Ashburnham, .	Chas. H. Pratt, .	4
8014,	W. S. Green,	Ashby,	Fred C. Allen, .	4
3-5,	Ralph Tredick,	Ashfield,	Chas. A. Smith, .	5
1018-W,	Horace Piper,	Ashland,	Theodore P. Hall, .	В
6 or 485,	Frank P. Hall,	Athol,	W. S. Penniman, .	5
34-R-4,	H. B. Packard,	Attleboro,	W. E. S. Smith, .	6
5-12,	J. F. Searle,	Auburn,	J. F. Searle,	5
3259-М,	Jas. W. McCarty,	Avon,	W. W. Beals,	7
	Douglas C. Smith,	Ayer,	D. C. Smith, .	4
144-2,	H. C. Bacon,	Barnstable, .	Robt. Cross, .	8
83-4,	A. E. Traver,	Barre,	K. M. Urquart, .	5
8000 or 18,	P. B. McCormick,	Becket,		-
	Irving C. Waite,	Bedford,	W. A. Cutler, .	1
10-2,	J. A. Peeso,	Belchertown, .	E. C. Howard, .	5
	L. F. Thayer,	Bellingham, .	Lewis E. Whitney,	6
409-W,	J. F. Leonard,	Belmont,	C. H. Houlahan, .	1
1367-М,	G. H. Babbitt,	Berkley,	A. A. Briggs, .	16
14-6,	Walter Cole,	Berlin,	E. C. Ross,	4
43-12,	Edson W. Hale,	Bernardston, .	Edwin B. Hale, .	5
319-J, ,	R. H. Grant,	Beverly,	James W. Blackmer,	2
22-2,	E. N. Bartlett,	Billerica,	John W. Bostwick,	1
479-J-3, Woon-	John H. McLaughlin, .	Blackstone, .	A. J. Gibbons, .	5
socket. 12-2,	I. E. Whitney,	Blandford,		-
9-3,	Albert I. Pardee,	Bolton,	C. E. Mace,	4
		Boston,	Park and Recrea-	1
			tion Department.	

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone			Local Moth	Div.
Number.	Forest Warden.	Town or City.	Superintendent.	No.
116-3, Sagamore, .	E. A. Ellis,	Bourne,	Edward D. Nick-	8
11-2,	H. J. Livermore,	Boxborough, .	erson. C. E. Sherry, .	4
	Harry L. Cole,	Boxford,	C. Perley,	3
4-4,	John N. Flagg,	Boylston,	Walter G. Brigham,	5
433-R,	J. M. Cutting,	Braintree,	Clarence R. Bes-	7
	T.IB. Tubman,	Brewster,	tick. Allison D. Rogers,	8
281-3,	F. C. Worthen,	Bridgewater, .	F.C. Worthen, .	7
18-2,	G. E. Hitehcock,	Brimfield,	C.W.King,	5
	Wm. F. Daley,	Brockton,	George C. Kane, .	7
109-13,	P. E. Gadaire,	Brookfield,	J. H. Conant, .	5
	Geo. H. Johnson,	Brookline,	Ernest B. Dane, .	1
52-8, Shelburne	Gilbert E.[Griswold, .	Buckland,		-
Falls. 15-4,	W. W. Skelton,	Burlington, .	W. W. Skelton, .	1
		Cambridge, .	J. F. Donnelly, .	1
47-M,	Frank C. Estes,	Canton,	Wm. H. Gallivan, .	7
76-M, Concord, .	Geo. G. Wilkins,	Carlisle,	G. G. Wilkins, .	1
16-2,	H. F. Atwood,	Carver,	H. F. Atwood, .	8
14-12,	A. L. Veber,	Charlemont, .		-
42-2,	E. A. Lamb,	Charlton,	J. D. Fellows,	5
28-3,	Geo. W. Ryder,	Chatham,	Chas. R. Nicker-	8
1597-R, Lowell, .	A. C. Perham,	Chelmsford, .	M. A. Bean,	1
		Chelsea,	Alfred L. Maggi, .	1
236-W,	Geo. F. Korn,	Cheshire,		_
7-4,	W. E. Major,	Chester,		-
4,	Chas. A. Bisbee,	Chesterfield, .		-
149-М,	John E. Pomphret,	Chicopee,	Edw. Bourbeau, .	5
	Robert W. Vincent, .	Chilmark,	A. S. Tilton, .	8
352-24,	D. W. Blanchard,	Clarksburg, .	F. E. Bishop, .	5
312-W,	A. J. Robinson,	Clinton,	Peter R. Gibbons,	4
260,	Wm. J. Brennock,	Cohasset,	Joseph E. Grassie,	7
23-2,	Frank A. Walden,	Colrain,	Edgar F. Copeland,	5
75-W,	Frank W. Holden,	Concord,	H. P. Richardson,	4
15-2,	Edgar Jones,	Conway,		-
8001,	Thos. A. Gabb,	Cummington, .		-
24-12,	Samuel L. Caesar,	Dalton,		-
North Dana pay	Leon H. Stone,	Dana,	T. L. Thayer, .	15
station. 295-W,	M. H. Barry,	Danvers,	T. E. Tinsley, .	2

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	Cl. TT 25 1			<u> </u>
1283-V,	Chas. H. Mead,	Dartmouth, .	E. M. Munson, .	8
35-R,	Henry J. Harrigan,	Dedham,	J. T. Kennedy, .	7
1171-М,	Wm. L. Harris,	Deerfield,	Wm. L. Harris, .	5
	Chas. E. Pierce,	Dennis,	Joshua Crowell, .	8
29-3,	Ralph Earle,	Dighton,	Albert N. Goff, .	6
11-4,	W. L. Church,	Douglas,	F. J. Libby,	5
63-11,	John Breagy,	Dover,	H. L. MacKenzie,	16
3353-2,	F. H. Gunther,	Dracut,	T. F. Carrick,	1
	F. A. Putnam,	Dudley,	Herbert J. Hill, .	5
5-11, Tyngs-	A. W. Swallow,	Dunstable,	W. H. Savill, .	4
borough.	F. B. Knapp,	Duxbury,	John D. Morrison,	7
8110,	Horace L. Belknap, .	E. Bridgewater, .	Frank H. Taylor, .	7
8-5,	A. Markham,	E. Longmeadow,	Hermon W. King.	5
24-3,	Adin L. Gill,	Eastham,	N. P. Clark,	8
8080,	J. M. Dineen,	Easthampton,	Chas. Kuhfuss, .	5
76 or 67,	Fred Hanlon,	Easton.	R. W. Melendy.	10
241-2	Manuel Swartz.	Edgartown,	John P. Fuller,	8
165-25.	Frank Bradford,	Egremont,	Tomar. Funci,	_
		Enfield,	H. C. Moore,	. 5
17-11,			Charles H. Holmes,	
	C. H. Holmes,	Erving,		5
	Otis O. Story,	Essex,	O. O. Story,	2
		Everett,	P. O. Sefton,	1
1686-Y,	C. F. Benson,	Fairhaven,	G. W. King,	8
822-W,	Wm. Stevenson,	Fall River,	Wm. Stevenson, .	6
136-2,	H. H. Lawrence,	Falmouth,	Wm. W. Eldridge, Jr.	8
745,	Page S. Bunker,	Fitchburg,	Page S. Bunker, .	4
9417-3, Hoosac Tunnel pay sta-	Horace B. Brown,	Florida,		-
tion. 96-5,	Ernest A. White,	Foxborough, .	F. S. Richardson, .	16
352-4,	B. P. Winch,	Framingham, .	N. I. Bowditch, .	16
66-12,	Edw. S. Cook,	Franklin,	J. W. Stobbart, .	6
5-11,	A. M. Hathaway,	Freetown.	G. M. Nichols,	16
191-M,	G. S. Hodgman,	Gardner.	T. W. Danforth,	5
	L. B. Smalley,	Gay Head,	J. W. Belain,	8
18-2 and 8046-2, .	Thos. A. Watson,	Georgetown,	Elwood T. Wildes.	8
15-12, Bernards-	Taris C. Marra	Georgetown, .	Henry D. Clark,	5
ton.			H. J. Worth,	2
10.4	H. J. Worth,	Gloucester, .	II. J. WOITH, .	4
18-4,	John S. Mollison,	Goshen,		

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

113, W. A. Collins,					0010.
18-2, . Elmer E. Sibley, . Grafton, . C. K. Despeau, . 5 6-4,		Forest Warden.	Town or City.	Local Moth Superintendent.	
6-4,		Rodney E. Bennett, .	Gosnold,		-
25,	18-2,	Elmer E. Sibley,	Grafton,	C. K. Despeau, .	5
327-W, D. W. Flynn, Great Barring-ton Greenfield, J. W. Bragg, Say-24, Enfield, W. H. Walker, Greenfield, J. W. Bragg, 5 5 5 5 5 5 5 5 5	6-4,	Geo. L. Murray,	Granby,	Geo. A. Harris, .	5
533-W, J. W. Bragg, Greenfield, J. W. Bragg, 5 33-24, Enfield, W. H. Walker, Greenwich, B. A. Sawtelle, 5 71-5 and 10, Chas. M. Raddin, Groton, Herbert W. Taylor, 4 2939-M, Sidney E. Johnson, Groveland, R. B. Larive, 3 5-2, Wm. L. Robertson, Halifax, F. D. Lyon, 7 128-M, Fred Berry, Hamilton, E. G. Brewer, 2 5-14, E. P. Lyons, Hampden, - - 17-F-2, Chas. Tucker, Hancock, - - 51-5, Rockland, Geo. T. Moore, Hanover, L. Russell, 7 46-3, Benj. J. Priest, Hardwick, Geo. J. Fay, 5 46-3, Benj. J. Priest, Harvard, G. C. Maynard, 4 403-3, John Condon, Harvarid, G. C. Maynard, 4 417-7, H. A. Holden, Haverhill, M. J. Fitzgerald, 3 17-7, H. A. Holden,	25,	H. A. Root,	Granville,		_
533-W, J. W. Bragg, Greenfield, J. W. Bragg, 5 33-24, Enfield, W. H. Walker, Greenwich, B. A. Sawtelle, 5 71-5 and 10, Chas. M. Raddin, Groton, Herbert W. Taylor, 4 651-33, E. P. West, Hadley, Leroy C. Sabin, 5 5-2, Wm. L. Robertson, Halifax, F. D. Lyon, 7 128-M, Fred Berry, Hamilton, E. G. Brewer, 2 5-14, E. P. Lyons, Hampden, - - 5-14, E. P. Lyons, Hampden, - - 6-15-3, Chas. Tucker, Hancock, - - 17-F-2, Chas. Tucker, Hancock, - - - 17-F-2, Chas. Tucker, Hancock, - - - - 4-6-3, Geo. J. Fay, Harver, J. Russell, 7 - - - - - - - - - - - -	327-W,	D. W. Flynn,		T. J. Kearin,	5
71-5 and 10, Chas. M. Raddin, Groton, Herbert W. Taylor, 4 2939-M, Sidney E. Johnson, Groveland, R. B. Larive, 3 651-33, E. P. West, Hadley, Leroy C. Sabin, 5 5-2, Wm. L. Robertson, Halifax, F. D. Lyon, 7 128-M, Fred Berry, Hamilton, E. G. Brewer, 2 5-14, E. P. Lyons, Hampden, - - 17-F-2, Chas. Tucker, Hampden, - - 17-F-2, Chas. Tucker, Hanoock, - - 12-23, Geo. T. Moore, Hanoock, - - - 12-23, Geo. J. Fay, Hardwick, Geo. J. Fay, 5 4 6-3, Benj. J. Priest, Hardwick, Geo. J. Fay, 5 4 4 4 4 4 4 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	533-W,	J. W. Bragg,		J. W. Bragg,	5
2039-M, Sidney E. Johnson, Groveland, R. B. Larive, 3 651-33, E. P. West, Hadley, Leroy C. Sabin, 5 5-2, Wm. L. Robertson, Halifax, F. D. Lyon, 7 128-M, Fred Berry, Hamilton, E. G. Brewer, 2 5-14, E. P. Lyons, Hampden, - - 17-7-2, Chas. Tucker, Hampden, - - 12-23, Geo. T. Moore, Hanoock, - - - 46-3, Benj. J. Priest, Hardwick, Geo. J. Fay, 5 Hardwick, Geo. J. Fay, 5 46-3, John Condon, Harwich, Arthur F. Cahoon, 8 Harwich, Arthur F. Cahoon, 8 Harwich, Arthur F. Cahoon, 8 Haweich, Seth W. Kingsley,	33-24, Enfield, .	W. H. Walker,	Greenwich, .	B. A. Sawtelle, .	5
651-33,	71-5 and 10, .	Chas. M. Raddin,	Groton,	Herbert W. Taylor,	4
5-2,	2939-М,	Sidney E. Johnson, .	Groveland,	R. B. Larive, .	3
128-M, Fred Berry, Hamilton, E. G. Brewer, 2 5-14, E. P. Lyons, Hampden, — — 17-F-2, Chas. Tucker, Hancock, — — 51-5, Rockland, Chas. E. Damon, Hanover, L. Russell, . 7 12-23, Geo. T. Moore, Hanson, Geo. T. Moore, 7 3-12, Gilbertville, Geo. J. Fay, 5 Hardwick, Geo. J. Fay, 5 46-3, Benj. J. Priest, Harvard, G. C. Maynard, 4 4 103-3, John Condon, Harwich, Arthur F. Cahoon, 8 9 -	651-33,	E. P. West,	Hadley,	Leroy C. Sabin, .	5
5-14, E. P. Lyons,	5-2,	Wm. L. Robertson,	Halifax,	F. D. Lyon,	7
17-F-2, Chas. Tucker, Hancock, - - - 51-5, Rockland, Chas. E. Damon, Hanson, Geo. T. Moore, 7 12-23, Geo. T. Moore, Hanson, Geo. T. Moore, 7 3-12, Gilbertville, Geo. J. Fay, 5 46-3, Benj. J. Priest, Hardwick, Geo. J. Fay, 5 403-3, John Condon, Harwich, Arthur F. Cahoon, 8 72-4, Fred T. Bardwell, Hatfield, Seth W. Kingsley, 5 5 - John B. Gordon, Haverhill, M. J. Fitzgerald, 3 17-7, H. A. Holden, Hawley, - - 5-18, S. G. Benson, Heath, - - 5-00, Geo. Cushing, Hingham, T. L. Murphy, 7 42-4, Winfred H. Stearns, Holbrook, Bradford Parks, 7 42-4, Winfred H. Stearns, Holden, W. H. Stearns, 5 5-21, Brimfield, Oliver L. Howlett, Holland, A. F. Blodgett, 5 113, W. A. Collins, Holliston, <td< td=""><td>128-M,</td><td>Fred Berry,</td><td>Hamilton,</td><td>E. G. Brewer, .</td><td>2</td></td<>	128-M,	Fred Berry,	Hamilton,	E. G. Brewer, .	2
51-5, Rockland, Chas. E. Damon, Hanover, L. Russell, 7 12-23, Geo. T. Moore, Hanson, Geo. T. Moore, 7 3-12, Gilbertville, Geo. J. Fay, Hardwick, Geo. J. Fay, 5 46-3, Benj. J. Priest, Harvard, G. C. Maynard, 4 103-3, John Condon, Harwich, Arthur F. Cahoon, 8 72-4, Fred T. Bardwell, Hatfield, Seth W. Kingsley, 5 John B. Gordon, Haverhill, M. J. Fitzgerald, 3 17-7, H. A. Holden, Hawley, - - 5-18, S. G. Benson, Heath, - - 5-18, S. G. Benson, Heath, - - - 5-00, Geo. Cushing, Hingham, T. L. Murphy, 7 42-4, Winfred H. Stearns, Holbrook, Bradford Parks, 7 42-4, Winfred H. Stearns, Holden, W. H. Stearns, 5 5-21, Brimfield, Oliver L. Howlett, Holland, A. F. Blodgett, 5 113, W. A. Colli	5-14,	E. P. Lyons,	Hampden,		_
12-23,	17-F-2,	Chas. Tucker,	Hancock,		-
3-12, Gilbertville, Geo. J. Fay,	51-5, Rockland, .	Chas. E. Damon,	Hanover,	L. Russell,	7
46-3,	12-23,	Geo. T. Moore,	Hanson,	Geo. T. Moore, .	7
103-3, John Condon,	3-12, Gilbertville,	Geo. J. Fay,	Hardwick,	Geo. J. Fay,	5
72-4, Fred T. Bardwell, Hatfield, Seth W. Kingsley, 5 17-7, H. A. Holden, Hawley, - - 5-13, S. G. Benson, Heath, - - 500, Geo. Cushing, Hingham, T. L. Murphy, 7 - A. N. Warren, Holbrook, Bradford Parks, 7 42-4, Winfred H. Stearns, Holden, W. H. Stearns, 5 5-21, Brimfield, Oliver L. Howlett, Holland, A. F. Blodgett, 5 113, W. A. Collins, Holliston, Herbert E. Jones, 6 1167-W, C. J. Haley, Holyoke, T. A. Bray, 5 248-W, Samuel E. Kellogg, Hopedale, C. E. Nutting, 5 19, Geo. W. Smith, Hopkinton, W. A. MacMillan, 5 35-11, W. L. Lovewell, Hubbardston, Ralph W. Hartwell, 5 4-11, John J. Kirby, Huntington, - - -	46-3,	Benj. J. Priest,	Harvard,	G. C. Maynard, .	4
Haverhill, M. J. Fitzgerald, 3	103-3,	John Condon,	Harwich,	Arthur F. Cahoon,	В
17-7,	72-4,	Fred T. Bardwell,	Hatfield,	Seth W. Kingsley, .	5
5-18, S. G. Benson,		John B. Gordon,	Haverhill,	M. J. Fitzgerald, .	3
500, Geo. Cushing,	17-7,	H. A. Holden,	Hawley,		_
A. N. Warren,	5-18,	S. G. Benson,	Heath,		_
134-W, Randolph, Melvin L. Coulter, . Holbrook, . Bradford Parks, . 7 42-4, . . Winfred H. Stearns, . Holden, . W. H. Stearns, . 5 5-21, Brimfield, . Oliver L. Howlett, . Holland, . A. F. Blodgett, . 5 113, . . W. A. Collins, . . Herbert E. Jones, 6 1167-W, . C. J. Haley, . Holyoke, . T. A. Bray, . 5 248-W, . Samuel E. Kellogg, . Hopedale, . C. E. Nutting, . 5 19, . . Geo. W. Smith, . Hopkinton, W. A. MacMillan, . 5 35-11, . W. L. Lovewell, . Hubbardston, Ralph W. Hartwell, 5 — - - Hudson, . F. P. Hosmer, 4 4-11, . John J. Kirby, . Huntington, - - -	500,	Geo. Cushing,	Hingham,	T. L. Murphy, .	7
42-4,		A. N. Warren,	Hinsdale,		_
5-21, Brimfield, . Oliver L. Howlett,	134-W, Randolph,	Melvin L. Coulter,	Holbrook,	Bradford Parks, .	7
113, W. A. Collins,	42-4,	Winfred H. Stearns, .	Holden,	W. H. Stearns, .	5
1167-W, . C. J. Haley, . . 5 248-W, . Samuel E. Kellogg, . . Hopedale, . C. E. Nutting, . 5 19, . . Geo. W. Smith, . Hopkinton, W. A. MacMillan, . 5 35-11, . W. L. Lovewell, . Hubbardston, Ralph W. Hartwell, 5 - - - Hudson, . F. P. Hosmer, . 4 - - - - Hull, . J. Knowles, . 7 4-11, . John J. Kirby, . Huntington, - - - -	5-21, Brimfield, .	Oliver L. Howlett,	Holland,	A. F. Blodgett, .	5
248-W, Samuel E. Kellogg,	113,	W. A. Collins,	Holliston,	Herbert E. Jones, .	6
19, Geo. W. Smith,	1167-W,	C. J. Haley,	Holyoke,	T. A. Bray,	5
35-11, W. L. Lovewell, Hubbardston, . Ralph W. Hartwell, 5 Melvin P. Mitchell, Hudson, F. P. Hosmer, . 4 Hull, J. Knowles, 7 4-11, John J. Kirby, Huntington,	248-W,	Samuel E. Kellogg,	Hopedale,	C. E. Nutting, .	5
35-11, W. L. Lovewell,	19,	Geo. W. Smith,	Hopkinton, .	W. A. MacMillan, .	5
Hull, J. Knowles, 7 4-11, John J. Kirby, Huntington,	35-11,	W. L. Lovewell,	Hubbardston, .		5
4-11, John J. Kirby, Huntington,		Melvin P. Mitchell,	Hudson,	F. P. Hosmer,	4
			Hull,	J. Knowles,	7
163-M, Arthur H. Walton, Ipswich, J. A. Morey, . 2	4-11,	John J. Kirby,	Huntington, .		_
	163-M,	Arthur H. Walton,	Ipswich,	J. A. Morey,	2

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
15-3,	Dr. A. B. Holmes,	Kingston,	R. F. Randall, .	8
261-W,	N. F. Washburn,	Lakeville,	N. F. Washburn, .	7
218-J,	Arthur W. Blood,	Lancaster,	L. R. Griswold, .	4
1295-24,	King D. Keeler,	Lanesborough, .	Geo. H. Judivine, .	5
362 and 90,	D. E. Carey,	Lawrence,	John A. Flanagan,	3
66-M,	Jas. W. Bossidy,	Lee,		-
37-5,	B. H. Fogwell,	Leicester,	J. H. Woodhead, .	5
135,	O. R. Hutchinson,	Lenox,	T. Francis Mackey,	5
28 and 29,	F. A. Russell,	Leominster, .	D. E. Bassett, .	4
9-44, Cooleyville,	O. C. Marvell,	Leverett,	I. H. Taylor, .	5
480,	Robert Watt,	Lexington,	O. J. Gorman, .	1
284-41,	Jacob Sauter,	Leyden,	Wm. A. Campbell,	5
44-W,	John J. Kelliher,	Lincoln,	J. J. Kelliher, .	4
17-4,	A. E. Hopkins,	Littleton,	A. E. Hopkins, .	4
6375-J,	Oscar C. Pomeroy,	Longmeadow, .		-
3400,	Edw. F. Saunders,	Lowell,	J. G. Gordon, .	1
1-12,	H. A. Munsing,	Ludlow,	Ashley N. Bucher,	5
20,	J. S. Gilchrest,	Lunenburg, .	James S. Gilchrest,	4
3015 and 1174, .	Geo. A. Cornet,	Lynn,	John R. Graham, .	2
	Lewis F. Pope,	Lynnfield,	L. H. Twiss,	. 2
	Watson B. Gould,	Malden,	W. B. Gould, .	1
319-W,	Peter A. Sheahan,	Manchester, .	P. A. Sheahan, .	2
1-R and 281-W, .	Herbert E. King,	Mansfield,	E. Jasper Fisher, .	В
355,	John T. Adams,	Marblehead, .	W. J. Stevens, .	2
117-2',	Geo. B. Nye;	Marion,	J. Allenach,	18
	Edw. C. Minehan,	Marlborough, .	M. E. Lyons, .	4
43-3,	Wm. G. Ford,	Marshfield,	P. R. Livermore, .	7
31-2,	Darius Coombs,	Mashpee,	W. F. Hammond, .	8
13-3,	Frank A. Tinkham, .	Mattapoisett, .	Frank A. Tinkham,	8
115-4 or 8-3, .	Geo. H. Gutteredge, .	Maynard,	A. Coughlin, .	4
39 or 119-4,	Wm. E. Bell,	Medfield,	G. L. L. Allen, .	6
53 or 138,	C. E. Bacon,	Medford,	Hugh G. Kennedy,	1
	John B. Durfee,	Medway,	F. Hager,	8
		Melrose,	J. J. McCullough, .	1
188-M, Milford, .	F. M. Aldrich,	Mendon,	F. M. Aldrich, .	5
	Chas. E. Hoyt,	Merrimac,	C. R. Ford,	3
2747,	Wilbur M. Freeman, .	Methuen,	A. H. Wagland, .	3

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
232-W,	W. H. Connor,	Middleborough,	Linam Chute, .	7
8000,	G. E. Cook,	Middlefield, .		-
63-14 and 63-25, .	Loren G. Esty,	Middleton,	B. T. McGlauflin, .	2
419-W,	E. J. Burke,	Milford,	P. F. Fitzgerald, .	5
152-2,	Harry L. Snelling,	Millbury,	E. F. Roach, .	5
5-2,	Chas. LaCroix,	Millis,	Everett Caldwell,	6
1442-25,	Ralph S. Carpenter, .	Milton,	Ralph S. Carpenter,	7
8-22, Readsboro,	H. S. Tower,	Monroe,		-
Vt. 12-22,	O. E. Bradway, '	Monson,	Robert S. Fay, .	5
14-4,	Thos. Berard,	Montague,	F. H. Gillette, .	5
164-25,	Jasper H. Bills,	Monterey,		-
3-24,	Andrew J. Hall,	Montgomery, .		-
17-21, Copoke, N. Y.	G. W. Patterson,	Mt. Washington,		-
N. Y		Nahant,	T. Roland,	2
16-5,	Peter M. Hussey,	Nantucket, .	C. C. Macy,	8
31 or 244-M, .	Bernard Darling,	Natick,	H. S. Hunnewell, .	6
195-W,	H. Howard Upham, .	Needham,	E. E. Riley,	6
	Chas. S. Baker,	New Ashford, .		-
2280,	Edw. F. Dahill,	New Bedford, .	Wm. P. Hammers-	.8
6-4, Gilbertville, .	Frank A. Morse,	New Braintree, .	ley. E. L. Havens, .	5
13-6,	E. M. Stanton,	New Marlbor-		-
10, Cooleyville, .	Sewell V. King,	ough. New Salem, .	Sewell V. King, .	5
173-5,	Wm. P. Bailey,	Newbury,	Percy Oliver, .	3
380,	Chas. P. Kelley,	Newburyport, .	C. P. Kelley,	3
30, Newton South,	W. B. Randlett,	Newton,	W. W. Colton, .	1
41-5,	Jas. T. Buckley,	Norfolk,	Wm. Buckley, .	16
205-W and 265, .	H. J. Montgomery,	North Adams, .	Jackson L. Temple,	5
1029-J,	Wm. L. Smith,	North Andover, .	Fred W. Phelan, .	3
317-2,	C. F. Gehrung,	North Attlebor-	F. P. Toner,	16
63-4,	Oscar C. Hirbour,	ough. North Brookfield,	S. D. Colburn, .	5
49,	Geo. E. Eaton,	North Reading, .	G. E. Eaton, .	1
165,	F. E. Chase,	Northampton, .	Chas. A. Maynard,	5
32-13 and 65-2, .	Arthur Johnson,	Northborough, .	Lewis H. Smith, .	5
13-3 and 71-5,	W. E. Burnap,	Northbridge, .	A. F. Whitin,	5
114-2,	F. W. Doane,	Northfield,	F. W. Doane,	5
29-11,	Geo. H. Storer,	Norton,	G. H. Storer,	6
7-12,	John S. Sparrell,	Norwell,	J. H. Sparrell, .	7

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
417-M,	F. W. Talbot,	Norwood, . '.	C. A. Bingham, .	6
119-4,	H. W. Chase,	Oak Bluffs, .	Frank F. Blanken-	8
17-5,	Chas. H. Trowbridge, .	Oakham,	ship. C. H. Trowbridge,	5
232-12,	Wm. Walsh,	Orange,	Joseph W. Oberg, .	5
33-2,	James Boland,	Orleans,	A. Smith,	8
	D. A. Witter,	Otis,		-
9-5,	Olin D. Vickers,	Oxford,	C. G. Larned, .	5
53-12,	James Summers,	Palmer,	C. H. Keith,	5
159-J, Cedar, .	F. L. Durgin,	Paxton,	F. L. Durgin, .	5
182-Y,	M. V. McCarthy,	Peabody,	J. J. Callahan, .	2
144-3,	Edw. E. Adriance,	Pelham,	Marion E. Richard-	5
7-23, Bryantville,	Jos. J. Shepherd,	Pembroke,	Wm. C. Jones, .	7
136-3,	G. M. Palmer,	Pepperell,	J. Tune,	4
11-2, Hinsdale, .	Arthur Kilbourne,	Peru,		-
61,	George Marsh,	Petersham,	Daniel Broderick,	5
176-6, Athol, .	W. H. Cowlbeck,	Phillipston, .	W. H. Cowlbeck, .	5
535-M,	Chas. L. Klein,	Pittsfield,		-
33-11, Cumming-	F. J. Butler,	Plainfield,		-
ton. 283-J, North At-	R. P. Rhodes,	Plainville,	George H. Snell, .	8
tleborough.	Ira C. Ward,	Plymouth,	A. A. Raymond, .	8
13-7, Kingston, .	D. L. Bricknell,	Plympton,	D. L. Bricknell, .	8
19-4, Cooleyville,	Fred W. Doubleday, .	Prescott,	C. M. Pierce,	5
13-4,	F. W. Bryant,	Princeton,	F. A. Skinner,	5
49-11,	J. H. Barnett,	Provincetown, .	J. M. Burch,	8
1,	Faxon T. Billings,	Quincy,	A. J. Stewart,	7
35-4,	Richard F. Forrest, .	Randolph,	John T. Moore, .	7
	Erving Chickering,	Raynham,	G. M. Leach,	6
518-W,	H. E. McIntire,	Reading,	H. M. Donegan, .	1
11-12,	B. F. Munroe,	Rehoboth,	R. E. Anderson, .	6
		Revere,	G. P. Babson, .	2
8-2,	Timothy B. Salmon, .	Richmond,		-
12-32,	Daniel E. Hartley,	Rochester,	Samuel H. Corse, .	8
55-X,	John H. Burke,	Rockland,	F. H. Shaw,	7
28-4,	John C. Martin,	Rockport,	F. A. Babcock, .	2
21-6,	Merritt A. Peck,	Rowe,		-
3-13,	Daniel O'Brien,	Rowley,	Chas. Curtis, .	3
279-2, Athol, .	L. G. Forbes,	Royalston,	P. F. Richards, .	5
		!	1	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
11-3,	S. S. Shurtleff,	Russell,		-
4-12,	Henry Converse,	Rutland,	H. E. Wheeler, .	5
		Salem,	Warren F. Hale, .	2
123-21,	James H. Pike,	Salisbury,	H. C. Rich,	3
202-12,	A. V. Wilber,	Sandisfield, .		-
43-2,	J. R. Holway,	Sandwich,	B. F. Dennison, .	8
346-W,	T. E. Berrett,	Saugus,	T. E. Berrett, .	2
4-16,	Clinton E. Tilton,	Savoy,		-
129-3,	E. R. Seaverns,	Scituate,	Lester D. Hobson,	7
462-J-2, Paw-	John L. Baker,	Seekonk,	C. A. Smith, .	6
tucket. 185-3,	W. C. Morse,	Sharon,	J. J. Geissler, .	16
26,	A. H. Tuttle,	Sheffield,		-
130-2,	Chas. S. Dole,	Shelburne,	Chas. S. Dole, .	5
	Milo F. Campbell,	Sherborn,	J. P. Dowse, .	16
16-21,	Asa A. Adams,	Shirley,	A. A. Adams, .	4
	Edw. A. Logan,	Shrewsbury, .	Robert C. Clapp, .	5
2-14, Cooleyville,	N. J. Hunting,	Shutesbury, .	Clarence A. Has-	15
2632-M, Fall	Wm. F. Griffiths,	Somerset,	kell. C. Riley,	6
River.		Somerville,	A. B. Prichard, .	1
22, Holyoke, .	Louis H. Lamb,	South Hadley, .	Louis H. Lamb, .	5
151-23,	C. S. Olds,	Southampton, .	C. S. Olds,	5
13, Marlborough,	Harry Burnett,	Southborough, .	H. Burnett,	5
11,	Aimee Langevin,	Southbridge, .	A. Langevin, .	5
8-2,	B. M. Hastings,	Southwick, .		-
125-2,	A. F. Howlett,	Spencer,	G. Ramer,	5
20, Indian Or-	C. S. Taylor,	Springfield, .	J. Alden Davis, .	5
chard. 5-12,	J. F. Wilder,	Sterling,	J. H. Kilburn, .	4
	Geo. Schneyer,	Stockbridge, .	Brown Caldwell, .	5
176-3,	Albert J. Smith,	Stoneham,	G. M. Jefts,	1
121-3,	Fred H. Pye,	Stoughton, .	W. P. Kennedy, .	7
225-X,	W. H. Parker,	Stow,	H. W. Herrick, .	4
6-1,	C. M. Clarke,	Sturbridge, .	C. M. Clarke, .	5
5-4,	Seneca W. Hall,	Sudbury,	W. E. Baldwin, .	4
46, South Deer-	A. C. Warner,	Sunderland, .	Richard Graves, .	5
field. 58-32,	R. H. Richardson,	Sutton,	R. H. Richardson,	5
1911-J,	Everett P. Mudge,	Swampscott, .	E. P. Mudge, .	2
468-W,	Thos. L. Mason,	Swansea,	A. E. Arnold, .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
1 or 320,	Fred A. Leonard,	Taunton,	L. W. Hodgkins, .	6
30 or 26-5,	C. A. Fletcher,	Templeton, .	J. B. Wheeler, .	5
4249-J,	Harris M. Briggs,	Tewksbury, .	H. M. Briggs,	1
161-4,	Elmer C. Chadwick, .	Tisbury,	H. W. McLellan, .	8
269-14,	Claude L. Vining,	Tolland,		-
8038,	C. W. Floyd,	Topsfield,	C. W. Floyd, .	2
37-2 or 51-2, .	F. J. Piper,	Townsend,	G. E. King,	4
-	Walter F. Rich,	Trure,	J. H. Atwood, .	8
1,	Otis L. Wright,	Tyngsborough, .	C. J. Allgrove, .	1
3-6,	Clifford Canon,	Tyringham, .		_
8000,	Geo. Z. Williams,	Upton,	Clarence L. Good-	5
101,	H. W. Phoenix,	Uxbridge,	rich. Willard Holbrook,	5
58 or 455-M, .	W. E. Cade,	Wakefield,	W. W. Whittredge,	1
13-21,	A. A. Hubbard,	Wales,	M. C. Royce,	5
107-2,	Jas. J. Hennessey,	Walpole,	Philip R. Allen, .	Б
6,	Geo. L. Johnson,	Waltham,	W. M. Ryan,	1
117-13,	Joseph Dupre,	Ware,	F. Zeissig,	5
45-23,	Delbert C. Keyes,	Wareham,	J. J. Walsh,	8
	Timothy M. Collins, .	Warren,	Alex. A. Gendron,	5
	Chas. A. Williams,	Warwick,	Charles Bass, .	5
12-4,	Lester G. Heath,	Washington, .		_
116, Newton North.	Van D. Horton,	Watertown, .	Van D. Horton, .	1
North. 31-3,	H. C. Haynes,	Wayland,	D. J. Graham, .	4
101-R.	E. L. Wallis.	Webster	C. Klebart,	5
9 or 359-M,	John P. Doyle,	Wellesley,	F. M. Abbott, .	6
	John Holbrook,	Wellfleet,	Wm. H. Gill,	8
6-23, Cooleyville,	Chas. A. Fiske.	Wendell	G. E. Mills	5
74, Hamilton, .	Jacob D. Barnes,	Wenham,	J. E. Kavanagh, .	2
10-6,	Geo. M. Hall,	W. Boylston, .	M. D. Potter, .	5
4137,	W. P. Laughton,	W. Bridgewater, .	O. Belmore.	7
114-3,	John H. Webb.	W. Brookfield, .	J. H. Webb,	5
	Louis H. Flook,	West Newbury, .	Frank D. Bailey, .	3
6961-J.	E. B. Jones,	W. Springfield, .	Geo. W. Hayden, .	5
8000.	B. P. Bissell,	W. Stockbridge, .		_
92-3,	Wm. J. Rotch,	West Tisbury, .	H. W. Athearn, .	18
	Geo. E. Walker,	Westborough,	Geo. Hayden, .	5
111-Y	Thos. H. Mahoney,	Westfield,		_
	LLOS LL MALOHOJ;			

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	Harry L. Nesmith,	Westford,	H. L. Nesmith, .	1
148-14,	Clayton A. Bartlett, .	Westhampton, .		-
1-3,	W. F. Neal,	Westminster, .	G. A. Sargent, .	5
1392-M, Waltham,	B. R. Parker,	Weston,	E. P. Ripley, .	4
41-21,	Frank Whalen,	Westport,	H. A. Sanford, .	8
635-W, Dedham,	Elmer E. Smith,	Westwood,	Martin Sorenson, .	6
185-M,	Walter H. Pratt,	Weymouth,	C. L. Merritt, .	7
39-14,	J. H. Pease,	Whately,	Rylan C. Howes, .	5
349-W,	C. A. Randall,	Whitman,	C. A. Randall, .	7
1-4, North Wilbra-	Henry I. Edson,	Wilbraham, .	F. B. Metcalf, .	5
ham. 8011-2,	John L. Brown,	Williamsburg, .	S. Ellis Clark, .	5
34-W,,	Wm. H. Davies,	Williamstown, .	Wm. Davies, .	5
28-2,	Oliver McGrane,	Wilmington, .	O. McGrane, .	1
29,	A. D. Bailey,	Winchendon, .	Jos. W. Crocket, .	5
123-2,	David DeCourcy,	Winchester, .	S. S. Symmes, .	1
201-12,	Amos S. Ferry,	Windsor,		-
		Winthrop,	Fred A. Whitte-	2
	Frank E. Tracy,	Woburn,	more. H. V. Macksey,	1
7110, Park,	Arthur V. Parker,	Worcester,	H. J. Neale,	5
10-22,	Chas. A. Kilbourn,	Worthington, .		-
23-5,	G. H. E. Mayshaw, .	Wrentham,	W. Gilmore,	6
53-31,	J. W. Hamblin,	Yarmouth,	C. R. Bassett, .	8

NEW LEGISLATION.

No new legislation was enacted at the last session of the General Court affecting the work of this department, except that the law relative to setting fires in the open air was so amended as to make it apply to all cities and towns in the Commonwealth. Prior to the passage of this amendment, this law has been operative only in such cities and towns as had by vote accepted its provisions. Several special resolves were passed authorizing and requiring the State Forester to make certain investigations of forest lands, and the reports upon these matters appear on other pages of this volume.

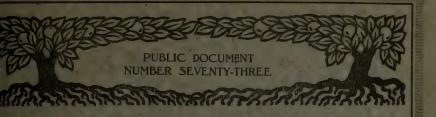
RECOMMENDATIONS.

- (1) That the co-operative work with the towns and individuals, where cranberry growing is being interfered with due to gypsy moth invasion, should be given further consideration and sufficient funds to prosecute the work begun last year.
- (2) That an appropriation for moth suppression equal to the amount asked for last year be made this year. The price of spraying material, arsenate of lead in particular, was nearly doubled in price the past year, and we very much fear it will continue to be expensive this year. Labor is also much higher and very scarce as well.
- (3) That the offices of tree warden and moth superintendent in towns and cities be combined and that the new official be known as town or city forester, to be appointed by the selectmen in towns and by the mayor and council in cities, subject to the approval of the State Forester, as is the present method in appointing the moth superintendent.
- (4) That the white pine blister rust be handled in a very drastic and systematic way the coming season. It is recommended that sufficient funds be appropriated for carrying on the work of eradication and suppression. It is believed that this work can best be accomplished by the joint efforts of the State Board of Agriculture and the State Forester.
- (5) That sufficient funds be appropriated to plant and protect such part as is suitable of the three State forests purchased by the State Forest Commission and cared for by law

by the State Forester. At present there are no available funds for such work. It is estimated that \$20,000 should be available for this purpose, either through the State Forest Commission or this department directly.

- (6) That the time has come for some wholesome regulations for the prevention of fires caused by sparks escaping from portable steam sawmills, steam rollers, steam tractors and steam shovels. Our reports through the State Fire Warden point out the necessity for this legislation.
- (7) The Commission on Economy and Efficiency recommended in its report on this department filed in December, 1914, that the general expenses of the department be apportioned among the several appropriations made for its work. The question has been discussed during the past year with the Auditor's Department and the office of the Supervisor of Administration, successor to the Commission on Economy and Efficiency, and the conclusion reached that a better way to deal with the matter is to make a separate appropriation for these general purposes. A bill is therefore submitted herewith to authorize such a separate appropriation.

F. W. RANE,
State Forester.



THE MASSACHUSETTS STATE FORESTER

FRANK W. RANE

FOURTEENTH
ANNUAL REPORT
1917



BOSTON: WRIGHT AND POTTER PRINTING COMPANY, STATE PRINTERS
32 DERNE STREET



THE

STATE FORESTER

OF

MASSACHUSETTS.

FOURTEENTH ANNUAL REPORT, 1917.

F. W. RANE, STATE FORESTER.



BOSTON:

WRIGHT & POTTER PRINTING CO., STATE PRINTERS, 32 DERNE STREET.

1918.



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SUPERVISOR OF ADMINISTRATION.

634.906M3 5792 1917 B

The Commonwealth of Massachusetts.

To the General Court.

In accordance with the provisions of chapter 409, Acts of 1904, the report of the State Forester for 1917 is herewith submitted.

In the stress of war times your State Forester is firmly convinced that we should make it a patriotic duty to try to enforce the fundamental principles of forestry, both in utilizing our present forestry products in the industries, and also in providing if possible for future needs.

With appreciation of the continued co-operation and good will accorded this department in its work, this report is

Respectfully submitted,

F. W. RANE,
State Forester.



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One of the State Forester's new motor truck sprayers in operation on a State highway. The same engine that propels the truck also runs the spray pump. Three of these machines were in use throughout the past season, and easily replaced many horse-drawn sprayers.



A photograph of the State Forester's nursery at the Bridgewater State Farm in Plymouth County. Ten acres have been set aside by Colonel Blackstone for the State Forester's use. With the exception of a foreman the entire work is done by the immates of the State Farm. The trees shown are Scotch pine transplants, and will be used with white pine in planting throughout the State next spring. There are approximately 1,000,000 trees in this nursery at present.

The Commonwealth of Massachusetts.

FOURTEENTH ANNUAL REPORT OF THE STATE FORESTER.

Introduction.

Forestry in Massachusetts in the future will be what we of today are far sighted enough to make it.

Massachusetts is a State that is naturally expected to be, and as a matter of fact is, a leader in most worthy undertakings, as her history shows. In forestry work a very creditable showing has already been made. We undoubtedly have the best forest fire protective system of any State. Our reforestation work is well under way, with approximately 15,000 acres set out to young forest trees. The practice of improvement thinnings and modern methods of forest management is yearly receiving more attention by woodland owners. Forest depredations of diseases and insects are given special consideration in regard to their eradication and control in this State. Yet with all our endeavors thus far, hardly more than a beginning has been made in the vast amount to be accomplished.

During the year the activities of the State Forester's Department have been more vigorously prosecuted than ever. Together with the usual work that has been reported upon from year to year, the changed conditions and new duties that have come as a result of the world war have necessarily completely altered many of our plans. While appropriations have been normal in general forestry work and gradually lessening in moth suppression, labor and materials of all kinds have greatly advanced. The department has practiced the strictest economy, and we believe a careful perusal of our activities as shown in this report will give the reader a better appreciation of our work.

In reforestation and nursery work, although labor has been scarce and high, we were able to secure enough of our old foremen and men to round out a most creditable year. While the planting season was interfered with by many rainy days, this weather was very favorable for the young trees, which came through the season in fine shape. The State Forester's nurseries everywhere are in splendid condition. One of the United States government forest officials upon a recent trip to New England highly complimented the department upon its accomplishments. Besides enough trees to use in our reforestation work, this year the State Forester has the sanction of the Governor and Council to distribute to persons who will plant them in Massachusetts not less than 1,000 nor more than 10,000 pine transplants at a fixed price of \$7 a thousand, packed for shipment at the nursery. It is believed this offer will tend to increase the interest in forest planting. Send in your orders at once if you wish to be on the list. The trees will be shipped in April. Every one interested in seeing young trees growing in nurseries should take a trip to the State Forester's nursery on the farm of the Massachusetts Agricultural College at Amherst, and to the Barnstable Nursery at Barnstable. A good beginning has been made in a transplant nursery at the State Farm at Bridgewater, where the work is done by the inmates under supervision of one of our foremen. A beginning is also being made in a similar way at the Norfolk State Hospital which it is hoped will grow in importance. Here, again, the work is done by the inmates of the institution.

During the year this department has consulted with the various county agents and schools soliciting their co-operation in forestry work, and it is believed much good will come out of our united action. The county officials are in direct touch with the landowners, and whenever an opportunity is afforded for forestry work this department can back them up with practical assistance, thereby getting something actually done. In the case of the county schools, it is an easy matter to start a small nursery here for demonstration purposes, and if the students have the time to spare, they could be used in April and May on our reforestation work throughout the county, receiving compensation for their services. In these war times labor will neces-

sarily be hard to get; therefore, why not plan on utilizing our young men of public school age in this work? The labor necessary in transplanting small trees is well adapted to the strength of boys of twelve years or over, and the experience gained would give them an interest in forestry in the future. We ask teachers and parents to think this over and take counsel with this department.

During the year the State Forester concluded, after giving much study to the question, to redistrict the moth work. As is shown by a map elsewhere in this report, this work is now organized practically according to counties. As the work is largely confined to the eastern part of the State, all of the western counties are included with Worcester County. All of the division men in charge of moth divisions as at present constituted are provided with automobiles which enable them to cover their territories, keep them in close personal touch with local public officials, and allow them to give necessary supervision for best results. The former division men who are without automobiles will be used on special moth work that may arise in co-operation with the various divisions. This plan will also have a tendency to bring about more uniform results, and allow us to give greater concentration to projects thought worthy of more consideration. The moth work has been raised in efficiency as a whole, and it naturally follows that the local moth superintendents who are experienced, and who have the confidence of the townspeople, do not need such close supervision as in the past. It is desirable as ever to keep the machinery well oiled and in good repair, but when this is in good running order, the time, attention and expense exercised in getting these results may be utilized in other and more important directions. Now that many of the cities and towns that have long been infested and have had State aid, not only in reimbursement, but also in supplies and machinery furnished, are gradually becoming self-supporting, it becomes the State's duty to render equal assistance to those towns and cities that have more recently become generally infested and are worthy of State aid.

The State appropriation at present is but a little over onehalf of what it formerly was for moth work, and with materials

greatly increased in cost, and labor more expensive, we are not in a position to do as much as heretofore. We are, however, getting more work done each year by individuals, and this, being self-supporting work, accomplishes results in the most satisfactory way. We, as a people, believe in self-reliance and self-help; the idea is associated with liberty and self-respect. Acting upon this principle, and with the belief that this is the true interpretation of the law, the State Forester has governed himself accordingly in dealing with the whole moth question. While the moth law plans for certain methods of assistance to towns from the State appropriation, this assistance is expected to be forthcoming only when it is a question of real need. One Massachusetts town deserves commendation in that while it spends large sums in excess of its liability, and could demand State reimbursement, it has never asked for one cent. The Commonwealth is to be congratulated upon such public-spirited communities as this.

A few of the main principles that the State Forester has endeavored to follow in moth work are:—

- 1. To develop a capable man in each city and town to have charge of the work, who has sufficient knowledge and experience to command the respect and confidence of his people.
- 2. To see that each town has sufficient modern equipment and materials to work with, and that they are properly cared for so that it is possible to accomplish good results.
- 3. To keep a practical working knowledge of moth conditions and estimates for getting results.
- 4. To avoid unnecessary expenses and keep the work as near self-supporting as possible.
- 5. To encourage private liability work, either by the local moth superintendent's force or private contractors. Whatever work is thus done lessens the infestation and betters conditions just so much, a step in the right direction towards suppression and control.
- 6. To keep cities and towns that have become self-supporting from getting careless and indifferent, thus allowing bad conditions to return.
- 7. To assist owners of infested woodlands and forests in thinning or operating their stands, with a view to present economic utilization and future production.
- 8. To aid all our citizens in Massachusetts to deal with the moth problems in the very best and most economic and practical way.
- 9. To reduce in so far as practicable the overhead expenses of the work to a minimum, in order to make available as large funds as possible for accomplishing the practical work desired.

10. To keep at all times a clear, concise and sufficiently detailed account of the expenditures and reports of the State work, so that we may be able to inform the public how the work is being administered.

11. To co-operate with the United States government in retarding moth distribution and spread into new territory, and in aiding in the propaga-

tion and dissemination of beneficial parasites.

When we consider the voracious and tenacious habits of the gypsy and the brown-tail moth we realize the seriousness of the battle that has been fought here in Massachusetts. The State has been liberal and long-suffering and patient, but the task has been one of no small proportions, and there is still work to do. Last year, due to war conditions, we were very fearful for a while that we might be unable to get sufficient arsenate of lead for our spraying. We finally were fortunate in getting a million pounds from the west at practically double the price we had paid a few years before, and later some of our local manufacturers came to our assistance in smaller lots which carried us through the season. In order to get the larger amount into New England in time for our use due to embargoes upon railroads, a whole train load of arsenate of lead, consisting of twenty-nine cars with engine and full train crew, came through from the west intact, consigned to the State Forester of Massachusetts. The value of this cargo was \$81,000.

Again this year we are fortunate in getting arsenate of lead at a favorable price, but a considerable increase over last year. We need to exercise, therefore, every precaution the coming season in the economic use of this insecticide. In labor, spraying machines and all other equipment there is a corresponding increase. Our appropriation, therefore, is only two-thirds as effective under present conditions as normally. The brown-tail moths are practically exterminated; for the past two years they have given us very little concern. The gypsy moths are controlled in the residential parts of our cities and towns, though our woodlands generally are infested throughout eastern Massachusetts. These woodlands are receiving attention, and through modern forestry methods of thinning, combined with good results from parasites and diseases, we are making substantial gains. This is no time for the pessimist.

The section of the State experiencing the worst infestation by

the gypsy moths at present is that contiguous to Middleborough and Wareham, and further south on the Cape proper. In this region the heretofore scattering infestations have become general, and henceforth their treatment needs the same thorough methods that have been practiced in the sections in and about Boston for years.

Since the United States government has confined its attention to the control of the spread of the gypsy moth, the State Forester has not had the splendid assistance formerly given within our infested territory, and this assistance has been greatly missed.

With the government taking the responsibility of their present important work and the parasitic work, however, we can well afford to assume this extra duty, although in so doing our expense has been greater. All things considered, therefore, we feel that great and satisfactory progress has been accomplished. Without discussing the subject further, suffice it to say that we need the whole-hearted co-operation and assistance of our people in this work, as ever. We have greatly reduced our appropriation, but increased expenses in every way, due to war conditions, naturally form a great handicap. We expect your continued support and confidence in this work.

During the year the State Forester was called into conference with Mr. James J. Storrow, chairman of the fuel committee of the Public Safety Committee of Massachusetts, relative to a request from the English government for our furnishing lumber men from New England for work in Great Britain. Upon studying the matter further, I made a report recommending that we organize and equip a number of portable sawmill units similar to those commonly used in Massachusetts. From this as a beginning, under the leadership of Mr. Storrow and his active committee, it resulted that all the New England States became interested, and the project was carried out in a very creditable manner.

At the time that the ten sawmill units were being formed and equipped, a request came from Major Greeley of the Forest Service for aid in listing men for the Tenth Engineers' Corps or Forestry Regiment for service in France. The State Forester was made a recruiting officer for Boston and Massachusetts, and

Lieutenant Wolfe of the United States Forest Service was sent on to assist in the work.

More details regarding our war activities are given elsewhere in this report.

Forest fire work of the year has not changed materially from heretofore. Four new observation stations have been built during the summer, one at Prospect Hill, Waltham; one in the central part of Martha's Vineyard; one at Charlton; and the fourth at Ragged Mountain in West Brookfield. The season was a favorable one, due to frequent rain and conditions which kept the vegetation green and moist. The work of inspection of engines has been portioned out into districts, and is now done by the various district forest wardens instead of special inspectors, as heretofore. With our forest observation system and improved organization we are in better shape than ever for future emergency when dangerous seasons come.

The examination work of forest tracts, where assistance is given the owner in forestry thinning and management, has been larger than ever, as is shown elsewhere in this report.

Forest utilization has received its full attention throughout the year, and with high cost and fluctuation of labor, due to losing men who have gone to war, it has been a busy time keeping the work going. The high prices for lumber and cordwood have changed conditions very much. The cordwood that usually has been hard to dispose of is now in great demand for fuel, and at present we are exercising our ingenuity to aid all sections of the State in the campaign to cut wood for fuel and at the same time improve conditions in the woodlands. The "cut a cord of wood" campaign is just getting fairly under way.

During the past year a greater interest has developed in our State work in the care and protection of trees than has ever been shown before. The correspondence courses on shade tree management and forestry that were the outgrowth of arrangements made by the State Forester with the Massachusetts Agricultural College were heartily entered into by a large number of our men. The State Forester's division men, city foresters, moth superintendents and tree wardens were enrolled to the number of over 200. The very fact that this was a voluntary undertaking, initiated in response to a request from a few moth

superintendents, and so heartily taken advantage of when offered, speaks for itself. When men take sufficient interest in their work to study nights and spare hours after working hard all day it shows they are interested.

Besides the above courses a splendid beginning was made the past fall in teaching these same men something of tree surgery. Arrangements were made to engage expert and experienced tree surgeons to hold demonstration schools in different sections of the State. The arrangements were made by the State Forester's division man in each case, and he was in immediate charge. It was indeed gratifying to see how readily and quickly this work was taken up by the men. It is proposed to continue this work the coming year. The past season the State Forester was much gratified to see the good work accomplished in such cities and towns as Taunton, Fall River, Springfield, Newton, Hudson, Leominster, Cohasset, Hingham, etc. The wholesome rivalry, where each man feels that his work is just a little better than the others, is also worth while. We have no desire to disparage the good work that is being done by reputable men or concerns who have accomplished splendid results, particularly upon the estates of many of our wealthy people. We do have, however, a great many trees in nearly every city and town that are needing attention at the hand of some one who is sufficiently trained and experienced to do the work intelligently, and there is plenty of work for many years to come for both the local official and the expert.

While correspondence courses on shade tree management and forestry, the practice of tree surgery, etc., are not the real field of the State Forester, nevertheless this office is constantly looked to by our people for assistance in this work. As a matter of fact, men who have had training in general forestry work are in a position to readily advise and assist in this work, as the fundamentals for success are the same. What is true of the above work is equally true of the diseases and insects common to our trees. When, therefore, last year, at the instigation of the Massachusetts Tree Wardens and Foresters Association, a bill was recommended to the Legislature for unifying the work that has to do with shade and forestry trees in general, it was believed that the time was ripe for such a step.

The bill provided for a forester in each town or city, whose duty should be to exercise the authority now vested in the offices of moth superintendent and tree warden, since it was felt that one person held responsible is more likely to get results than where the responsibility is divided. It did not pass. Perhaps its advocates are mistaken in their judgment that such a step would really be productive of good results. Until the responsibility is legally placed upon this department by the Legislature, it is in no way to blame for the maltreatment of the trees that are destroyed or disfigured by lumber, power, electricity, gas and telephone companies. The abuse of the street and roadside trees is constantly thought to be due to neglect on the part of the forestry department. It is but natural that this department should desire to make it clear that this is not the case.

The results of the cleaning work done about the shores of cranberry bogs for a certain distance back, which has been in progress for the past two seasons, thus checking the invasion of the gypsy moth larvæ, have fully demonstrated its usefulness the past season. The satisfactory conditions were brought out in one question put to the State Forester, when the feeding of the insects was at its height, by one of the members of the Cranberry Growers Association committee, who has shown great interest in the work. "Well, what would have been the conditions now, Mr. Rane, if we had not begun when we did?" The cranberry interests are large in Massachusetts, and the cooperation shown has been of the best.

The white pine blister rust that has been so prominently called to the attention of people in recent years as a menace to the white pine has received more consideration than ever during the past year in Massachusetts. The State appropriation allotted to this work was \$50,000, and the United States government was expected to spend in the State an equivalent amount. Though this work was not directly under the supervision of this department, the State Forester's organization was used by the State and government officials in carrying out the methods and plans outlined. The report of this season's work has not been received as yet, but it is hoped that some real progress will be forthcoming. In the spring the State Forester destroyed several infestations that had been found the previous season, at a time

when the infested pines were just beginning to show the fruiting spores. It will probably take time to more fully determine many important matters regarding this disease. The State Forester's Department was not responsible for the destruction of the currants and gooseberries this year, as this work was in direct charge of the State Board of Agriculture.

The three auto-truck traveling sprayers that were built for the department were used continuously throughout the season, and proved great factors in the success of the season's work. By being able to cover a much larger territory than would be possible with horse-drawn sprayers, a saving was made in both team hire and men, which is of great importance in these times.

The State Forester has addressed many important organizations during the year, chief among which have been the North Eastern Lumbermen's Association at Bangor, Me.; the New England Nurserymen's Association at New Haven, Conn.; the Society for the Promotion of Agricultural Science at Washington, D. C.; the Eastern Shook and Wooden Box Association at Boston; the Massachusetts Horticultural Society (Lowell lecturer); and the Forestry Club of the University of Maine. Other addresses, talks and meetings attended by the State Forester and his assistants this year are listed in the latter part of this report.

Other matters of importance are emphasized more in detail in this report. Your continued hearty co-operation is expected throughout the coming year by the State Forester and his coworkers and assistants.

ORGANIZATION.

There have been relatively few changes in the personnel of the working force during the year.

The general office staff remains exactly the same as last year. Among the foresters, Mr. Chas. R. Atwood, B.Sc., who was stationed at Springfield, resigned to accept the supervision of one of the sawmill units sent to England, and Mr. Herbert E. Henshaw, who for a few years previous to entering the New York College of Forestry was a foreman in the department, was appointed to fill Mr. Atwood's old position. One of the forestry foremen, Mr. J. L. Peabody, and also Mr. R. F. Wilder have

joined the colors, and are with the Twentieth Forestry Regiment, and Mr. Ainsley C. White has enlisted in the navy.

Of the moth men Mr. J. A. Farley, who was connected with the work of moth suppression for a great many years, resigned on November 21 last.

The forest fire districts have been made into five instead of four, while the positions of locomotive inspectors have been abolished, and this work distributed to each of the districts.

There have been some changes among the observers in the fire towers. Mr. Henry H. Hammond of the Chelmsford tower has died. He was a very faithful and enthusiastic forest-fire observer.

The redistricting of the moth work has been made with reference to county lines.

The present organization of the department is as follows: —

GENERAL STAFF.

F. W. RANE, B.Agr., M.S.	c., .		State Forester.
C. O. BAILEY,			Secretary.
ELIZABETH HUBBARD, .			Bookkeeper.
ELIZABETH T. HARRAGHY,		1.	Stenographer.
JENNIE D. KENYON, .			Stenographer.
MABEL R. HAMNETT, .			Clerk.
ROBERT HARDING, .			Office boy.
4			

GENERAL FORESTRY.

* Torrestant Torres	A . S ATA	 •	•	State I diester.	
Н. О. Соок, М.Г.,				Assistant forester in charge.	
W. D. CLARK, M.H	₹.,			Assistant forester (Amherst).	
J. R. SIMMONS, B.S.	Sc.,			 Reforestation work.	
C. R. ATWOOD, B.S.	Sc., 1			Assistant forester.	
HERBERT E. HENS	HAW,			Assistant forester (Springfield).	
JAMES MORRIS,				Assistant.	
EBEN SMITH,				Superintendent, Barnstable Nursery.	
J. A. PALMER,				Superintendent, Amherst Nursery.	
L. W. BRYAN,				Superintendent, State Farm Nursery.	
J. L. PEABODY, 1				Field foreman.	
AINSLEY WHITE, 1				Field foreman.	
H. N. BUTLER,				Field foreman.	
H. H. CHASE,				Field foreman.	
FRED W. PARKER,				Field foreman.	
JOHN H. SAXTON,				Field foreman.	

¹ Enlisted.

MOTH WORK.

Staff.

Te	W	RANTE	BAor	M.Sc.,		State	forester.	
	VY .	TLANE,	D.ARI.	TAT · D.C.		Duale	TOTOSUCT.	

GEORGE A. SMITH,			Assistant	(equipment,	accounts, etc.)	
PAUL D. KNEELAND,	M.F.,		Assistant	(woodlands,	products, etc.)	

District Moth Men.

Supplies.

- 1. Saul Phillips, Beverly. 4. W. F. Holmes, Wareham.
- 2. Wm. A. Hatch, Marlborough. 5. Harry B. Ramsey, Worcester.
- 3. C. W. PARKHURST, Foxborough.

FRANCIS V. LEAROYD,

FOREST FIRE PREVENTION.

Staff.

F. W. RANE, B.Agr, M.Sc.,		State Forester.
M. C. Hutchins,		State Fire Warden

JOSEPHA L. GALLAGHER, . . . Clerk.

District Forest Wardens.

- 1. Jos. J. Shepherd, Pembroke. 4. John P. Crowe, Westborough.
- 2. MINER E. FENN, Needham. 5. ALBERT L. ORDWAY, Westfield.
- 3. James E. Moloy, Woburn.

Observers.

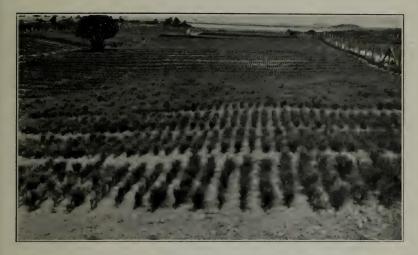
CALVIN C. PARKER, North Harwich.
JOSEPH JENKINS, Barnstable.
W. I. MOODY, West Falmouth.
WALTON F. RAYMOND, Bournedale.
F. L. BUCKINGHAM, Kingston.
D. M. SMITH, Waltham.
LAWRENCE E. SAMPSON, Middleborough.
JOHN H. MONTLE, Fall River.
R. J. ZILCH, Rehoboth.
CHAS. F. KIMBALL, Hanson.
EDWARD D. SPRAGUE, Hingham.
JOHN H. BACON, Sharon.
Mrs. WM. DAY, Martha's Vineyard.
F. R. STONE, Sudbury.

JOHN H. O'DONNELL, Wakefield.

LEWIS F. HAMMOND, Chelmsford.

FREDERICK W. ALDRICH, Georgetown. Myles O. Burnham, Manchester. ROBERT McLaughlin, Mendon. JOHN ROCHE, Westborough. JAMES MALEY, Princeton. WM. E. TAYLOR, Warwick. GEORGE W. CLIFFORD, Pelham. GEORGE B. SHERMAN, Brimfield. CHARLES PUTNAM, Westfield. N. C. WOODWARD, Shelburne Falls. H. H. FITZROY, Savoy. ELMER HUNT, Chester. JOHN E. CURTIN, Tolland. CLAYTON BUNK, Great Barrington. ROBERT MILLER, Pittsfield. CLIFFORD GEORGE, Williamstown.

For list of forest wardens and local moth superintendents, see page 89.



A large plantation of red pine transplants in the Barnstable Nursery. As this species is in great demand for use in mixed plantations with white pine, they are at present a very valuable stock. These trees will be used largely in our State work. Red pine seed is not to be had this spring.



White pine transplants that were set among scrub oak or acorn brush on Martha's Vineyard following a forest fire. The small trees were four years old when set three years ago, and have grown on an average from 1 to 2 feet each year during the past two years. They will undoubtedly overcome the oak.

This plantation is on the fish and game farm in the center of the island. A tract of 20 acres joining this planting was set out the past season for the Commission by this department, the species used being a mixed planting of white and red pine.



WAR ACTIVITIES.

This department has been fortunate in being able to help along the lines of war and emergency work probably more than any other State department except those especially created for the purpose. In fact, the moth thinning and utilization branch of the department is devoting practically all its energies along war lines. The war has created a tremendous and unforeseen demand for woods labor, which we have helped to supply. The fuel emergency has created a necessity for increased use of cordwood as a substitute for coal. We are helping to increase the production and supply the demand. We are supplying the army with considerable wood at a lower price than any private individuals, and thus saving the government money.

Sawmill Units sent to England.

Last April, soon after the declaration of war, Mr. Storrow, chairman of the Committee on Public Safety, received a cablegram through Colonel Gaston, from the British War Office, stating that America could help more just then in furnishing men and equipment to produce lumber and wood in England than in any other way. On account of the lack of transports it is impossible to ship the lumber from this side, and so it must be produced over there, as lumber is vitally necessary. Storrow immediately got in touch with the State Forester, and from the plans drawn up then, the ten sawmill units were organized, equipped and sent. Most of the lumbermen of New England helped in the work, but this department was the center of the activities. The State Forester acted as secretary of the general committee which had charge of the organization of the mill units. Mr. Kneeland served on three of the subcommittees which furnished the mills, the camp equipment and the men. He devoted his entire time for a month to the work. Mr. Cook, Mr. Lucas and Mr. Hunter gave considerable of their time. Charles R. Atwood, western Massachusetts field agent, went as foreman of Unit No. 1. Twelve of the woodsmen who had been working for the department went with him. Therefore this department feels that it was responsible, more than any other single body, except the Public Safety Committee, for

the success of the expedition. Within thirty days from the time the start was made, 360 experienced woodsmen with their complete equipment, everything from sawmill boilers to bean pots, including 120 horses, were placed on shipboard. The States and lumbermen of New England raised the \$150,000 to pay for them, and sent them as a gift from New England to Old England. They are now producing lumber twice as fast as anybody has done before over there with similar equipment, and doing it for half the cost. New England may well be proud of its sawmill units, and this department of its share in them. Mr. Atwood writes in October that Unit No. 1, Massachusetts State Forester's Unit, has a record for production, having cut out 18,000 feet of sawed lumber in one day. These mills began work in Scotland, some of them being on the Carnegie Estate at Ardgay, County Rosshire.

Recruiting for Forestry Battalions.

Immediately following the sawmill units, this department was requested by the United States Forest Service to assist in raising men for the so-called Forestry Battalions of the United States Army Engineer Corps. The State Forester was appointed listing agent for the recruiting of the men. For a while office room was provided for one of the officers of the regiment who aided in the listing. Since then Mr. Lucas has acted as listing agent, examining over 300 men of whom about 40 were accepted. Five different press notices were sent to the newspapers of New England to aid in the listing, and several hundred letters were answered concerning these battalions. Several of our men have already gone in them, and Mr. Kneeland and Mr. Cook were offered commissions. We are glad they did not go, as they can be of more service here.

Furnishing Wood to the Army.

Last year about 5,000 cords of wood were cut in thinning operations under our supervision. It has been possible for us to furnish about 1,400 cords of this wood to the army at a considerable saving. About 100 cords were furnished to the camp at Framingham at \$5 a cord, — less than they had been paying private contractors. About 300 cords were furnished to the

forts in Boston Harbor at several dollars under the market price. One thousand cords are being furnished to Camp Devens at a lower figure than for any wood furnished by other contractors. We also have reason to believe that by our action we have kept the prices of the wood furnished by private individuals at a more reasonable level than would have been the case otherwise. We have offered to furnish all the wood to the army at cost plus a reasonable profit, but, due to its system of contracts, the Quartermaster's Department has been unable to accept our offer. We are now cutting wood which we hope to furnish to the army on that basis another year.

FUEL EMERGENCY.

Last spring we saw the present wood shortage coming. Most of the stocks of dry wood had been exhausted and green wood was being used. Several statements were issued in which it was urged that more wood be produced as a matter of profit. Now the coal shortage has made the greater production and use of wood a war measure and a patriotic necessity. Last summer we called upon the Committee of Public Safety to help us in producing wood, but they did not deem it expedient at that time. Lately, however, the situation has become so acute that a Wood Fuel Committee has been formed to increase the wood supply. The State Forester is an active member of this committee. All possible efforts are being made through the regular channels of the thinning work to heighten wood production. A special wood-sawing machine will soon be in operation by which it is hoped that wood can be produced for the same price with regular day labor as with the cord labor, which is now almost impossible to obtain. If this machine succeeds, we hope to place several others in operation before spring. They will have a capacity of about ten cords a day. A bulletin to encourage the use and production of wood for fuel has been printed by this office. Wood will be even more necessary and important next winter than it is this, and we are bending every effort to help, and are willing to help even more if the capital can be provided. Whether the war ends soon or not, the Massachusetts woodlot will have to do a great deal toward keeping our homes warm and our industries running. All who want help in the wood question are invited to call on us.

UTILIZATION.

Special efforts have been made along the lines of utilization this past year. The idea of proper utilization is to prevent waste, and to put the tree into the products for which it is best suited, and from which the highest returns will be received. On our co-operative operations we have experimented with various kinds of products, and have thus obtained valuable practical information and data. The charcoal experiment was completed and the product has been sold. The results show that for wood at a distance from the market or the railroad, and for wood of inferior quality, charcoal has distinct commercial possibilities. We hope to publish a report on the matter a little later. Considerable practical advice on utilization has been given and used to advantage even by lumbermen. We have sold or helped to sell both wood and lumber for their producers, and are willing to help anybody along those lines without charge. We hope to be able to expand the utilization work to much larger scope in the near future, for the practice of forestry is greatly encouraged by giving the small owner of forest land an accurate idea of the use and value of forest products. With this knowledge he, the permanent holder of the land, is able to profit rather than the lumberman, whose only idea is necessarily the rapid conversion of the woodland he owns into profit.

OPERATIONS.

During the past year fifteen co-operative operations have been carried on. A list follows: —

Name of Owner.	Location.	Area (Acres).	Character of Operations		
Cochituate Realty Trust, Mrs. Currier, Joseph S. Fay, Jr., Estate, George B. Fiske, Clifton Johnson, Karlstein Estate, William M. Kiely, Lawrence Minot, H. C. Mulligan, E. R. Peirce, Arthur G. Rotch, J. J. E. Rothery, Joseph A. Skinner, Robert K. Snow, Robert Winsor,	Wayland, Pembroke, Falmouth, Wayland, Hadley, Dedham, Hadley, Wareham, Wayland Weston, Lakeville, Sandwich, Hadley, Wayland, Weston,	40 12 200 10 5 15 2 80 25 50 150 50 150 20 20 125	Sawmill. Cordwood. Sawmill and spraying. Sawmill. Sawmill. Cordwood. Sawmill. Cordwood. Sawmill. Cordwood. Sawmill. Cordwood. Sawmill. Cordwood. Sawmill. Cordwood. Sawmill.		

On these operations \$50,168.81 have been spent from the capital furnished by the owners of the land; 1,470,055 feet of lumber, 9,730 railroad ties and 4,630 cords of wood have been cut. The gross returns from these operations to the owners have been or will be about \$75,000, leaving a net profit to the owners of about \$25,000. In expense is included the cost of burning brush and even of spraying in several cases. Thus it will be seen that the work was profitable. In all these operations the proper practice of forestry, that is, the removal of trees that should be cut because they were damaged or mature. and the leaving of trees that were of greater value for the future of the land, was the prime consideration rather than the gaining of the highest financial returns. However, in several cases larger returns were realized than could have been obtained by selling the growth to some lumberman who would have cut regardless of the future.

WALPOLE MUNICIPAL FOREST.

The second celebration by the townspeople of Walpole, in which all of the school children joined, was held on Arbor Day this year. Appropriate exercises were held in which the State Forester took part. At the close of the exercises each person present was requested to plant a tree in the town municipal forest. This sight in itself was interesting and well worth while. This beginning was made possible through the generosity of two public-spirited townsmen, Mr. Charles Bird, Jr., and Mr. Geo. Plympton, who conceived the idea and had it so well carried out. The example is one that will be followed, it is believed, by other cities and towns. It was a pity that a moving picture could not have been made of the hundreds of children when they were all so busily engaged in planting. It was a picture well worth preserving.

This town or municipal forest, which is now over two years old, is in close proximity to the schools and playgrounds, and will, it is predicted, prove a great and lasting tie of fellowship between the present and future generations, and besides, prove an object-lesson in practical conservation.

REFORESTING SCRUB OAK OR ACORN BRUSH LANDS.

It is believed that this class of lands which is so common on the Cape, and found here and there occasionally in other sections of the State, as on the Montague and Westfield plains, can be handled readily so that they may be reclaimed for forestry. These lands are not infrequently burned over by forest fires, and if the area is at once set in the early spring to pine transplants, preferably strong four-year-old stock, good results will ensue if the season is favorable. Our practice is to set the transplants in the open spaces between the brush, and to determine the number to plant per acre by the openings available. Generally speaking, these openings are well spaced and offer ideal conditions for work. Small white pine transplants that were handled in this way in various places are giving very encouraging results. A photograph of a planting made upon the game farm on Martha's Vineyard may be seen in this report. The photograph was taken by the State Forester on September 21 of this year, and it will be observed that the pines have made an average growth for each of the past two seasons of a foot each. That the pines have established themselves and will be able to subdue the scrub oaks there is little doubt. The transplants have been set three years in their present place. is believed that when the pines are well established the oaks will be really of assistance, as they shade the ground in summer, and their leaves afford a mulch on the ground at other seasons of the year. Where the scrub oak is thick and large the expense of clearing it renders the undertaking impracticable, but if it can be burned over by a hot fire which is within control the conditions for planting are then considered very favorable. These experiments will be watched with interest.

THE ORIENTAL HAG MOTH.

A very severe outbreak of this insect occurred during the last summer season. This is an imported insect, found first in Dorchester in 1906. It is a very voracious feeder, and this past season stripped many fruit trees in Dorchester and Roxbury. It is hatched from the egg in July and feeds all summer, forming a hard, woody, egg-shaped cocoon the latter part of September or first of October. It remains as a larva in the cocoon all winter, changing to a pupa in spring and emerging an adult moth in the latter part of June. The moth then lays its eggs on leaves or twigs. Though the presence of this insect has been known since 1906, it has not spread to any extent until this season. The numbers of the insects have not seemed to be on the increase, perhaps owing to the birds or to some other unknown agency. This fall cocoons have been found as far from the original infestation as Canton. We feel it our duty, therefore, to warn the public of the danger from this insect. The larvæ have nettling hairs, and care should be used in handling them. They are also very voracious, and will strip a tree in a short time when they are plentiful. It is possible that two or three favorable seasons may greatly increase the numbers of this insect, and render it a formidable insect enemy. It is, of course, controlled by spraying at the proper season, but this will not be the same time that spraying is done for the gypsy moth. We hope that this word of warning will be unnecessary, but we feel that all persons interested in insect suppression should be on their guard.

THE TUSSOCK MOTH.

This insect has been in evidence in most sections of the State during the past season. The outbreaks at Pittsfield and Nantucket were particularly heavy. The writer has never seen so many pupæ and egg clusters as in a single colony which extended over about half an acre in the city of Pittsfield the past fall. The larvæ had literally stripped several maple trees, and the white patches practically covered everything in sight. Besides the tree trunks and limbs, telephone poles, fences, etc., were one white-coated mass. At Nantucket the infestation was generally bad throughout the town. Their natural enemies evidently were unable to keep them in check. Fortunately these insects are held in check by the same methods as are used in handling the gypsy moths, namely, by creosoting the egg masses and spraying with arsenate of lead when the larvæ are eating in the spring or summer.

Forestry Co-operation.

Co-operation has always been a keystone in the work of the Massachusetts Forestry Department, - co-operation with the town, co-operation with other governmental agencies, and cooperation with the individual landowner. It has been our belief that a dollar of the money of the Commonwealth placed with several more contributed by town or individual, and used for forest protection or development, is more profitable for the State as a whole than the same dollar used exclusively in State work, and town or individual left to shift for themselves. the gypsy moth and fire protection work co-operation is largely with the town, while in the utilization and forestry branches co-operation is largely with the private individual. We have added to our co-operative agencies this year the county farm bureaus. There is now one of these bureaus in each county of the State save Nantucket. These farm bureaus act as the local representatives of the United States Department of Agriculture and the Massachusetts Agricultural College, and it is our plan to make them feel that they are also representative of this department as well. To this end we have supplied them information and literature regarding the work of the department, supplied press articles for their monthly bulletins, and in other ways maintained personal contact with them. The county agents have responded to this invitation for co-operation in a most gratifying manner, and although the work is but three months old it gives indications of being a most useful experiment. Several counties also maintain agricultural schools, and these offer an inviting field for co-operation in educational work which should bring fine results. The work of teaching in these schools, and keeping in touch with the county agents, might well occupy the entire time of one assistant, and if the right man could be found would prove a valuable addition to our force.

ACTIVITIES IN GENERAL FORESTRY.

Because of the varied nature of the work of this branch of the forestry department it is difficult to express it in figures, yet the following summary may be of interest:— Reforestation lands: -

New plantations set out, 12; 400 acres; 300,000 trees.

New plantations brushed, 8; 142 acres. Old plantations brushed, 10; 225 acres.

Old plantations filled in, 6; 40,000 trees.

Otter River State Forest: -

Planted, 60 acres; 47,000 trees.

Brushed, 70 acres.

Nurseries: -

Transplants shipped from, 900,000. Seedlings transplanted in, 1,560,000.

Seed beds put in, 430.

Examinations of woodlots, 104; 5,000 acres.

Surveys, 7 lots; 250 acres.

Operations supervised, 11; 150 acres.

FORESTRY EXAMINATIONS.

The examinations of private property made this year exceed in number those of previous years. It is not to be supposed that an examination ends with a visit to the land and the advice given the owner, but our service is extended to finding purchasers for the cut of standing wood, or obtaining men to do the work which was advised. There have been an unusual number of applicants seeking estimates and buyers for the standing wood and timber on their woodlots. This is due to the rapidly advancing prices of forest products, which have made many owners think of disposing of their woodlots. Some States do not make estimates, on the ground that such assistance is not the work of a forestry department, and that people should be willing to hire professional estimators for such work. We believe, however, that assisting the landowner to dispose of his woodlot, provided it is economically operated, is a legitimate part of our business, and helps in the proper use of our forests. This department welcomes and is glad to further the work of reputable professional estimators, and give reference to them for such work. We want the landowners to understand that in making estimates of woodlots this department must be fair to the possible purchasers as well as to the owners, and that we cannot make our valuations high to satisfy the seller at the expense of the purchaser.

The following table shows the kind and variety of work that

this department has been able to do in aiding our forest owners throughout the State for the past year. Again, this is independent of the moth-thinning work, which is of equal importance, although carried on by another division.

LIST OF FOREST EXAMINATIONS, 1917.

Bemis, A. A.,				
Bacon, F. W., Newton, 5 Trimming and cutting. Baxter, Adelaide A., North Weymouth, 27 Thinning. Bell, E. H., Southampton, 200 Cutting, thinning and estimate. Bemis, A. A.,	NAME.	- Town.	Area (Acres).	Problem.
Baxter, Adelaide A., North Weymouth,	Ashton, Harriett,	Middleton,	50	Cutting.
Bell, E. H.,	Bacon, F. W.,	Newton,	5	Trimming and cutting.
Bemis, A. A.,	Baxter, Adelaide A.,	North Weymouth, .	27	Thinning.
Bemis, A. A., Spencer, 90 Chestnut blight. Bill, N. B., South Worthington, 40 Blister rust and weevil. Brooks, Merrill D., West Granville, 30 Thinning. Brown, Alice M., Williamstown, 30 Cutting. Brown, Charlotte, Concord, 8 Cutting. Burnham, F. E., Essex, 40 Blister rust. Cambridge, city of, Fresh Pond, 10 Aphis. Channing Sanitarium, Wellesley, 50 Chestnut blight thinning. Chapin, C. H. B., Tolland, 300 Cutting and planting. Chapin, C. H. B., Palmer, 25 Chestnut blight thinning. Clark, A. B., Palmer, 25 Chestnut blight cutting. Cook, Martha, Heirs, Stowe, 36 Cutting. Curtis, Miss R. E., Brighton, 1 Tree diseases. Dexter, Mr., Blandford, 5 Insects. Durant, Clark T., Great Barrington, 6 Thinning and planting. F	Bell, E. H.,	Southampton, .	200	Cutting, thinning and esti-
Brooks, Merrill D.,	Bemis, A. A.,	Spencer,	90	
Brown, Alice M., Brown, Charlotte, Concord, Burnham, F. E., Essex, Burnham, F. E., Cambridge, city of, Channing Sanitarium, Wellesley, Chapin, C. H. B., Clark, A. B., Clark, A. B., Cutting. Brighton, Bright	Bill, N. B.,	South Worthington,	40	Blister rust and weevil.
Brown, Charlotte,	Brooks, Merrill D.,	West Granville, .	30	Thinning.
Burnham, F. E., Cambridge, city of,	Brown, Alice M.,	Williamstown, .	30	Cutting.
Cambridge, city of, Fresh Pond,	Brown, Charlotte,	Concord,	8	Cutting.
Channing Sanitarium,	Burnham, F. E.,	Essex,	40	Blister rust.
Chapin, C. H. B., Tolland,	Cambridge, city of,	Fresh Pond,	10	Aphis.
Clark, A. B.,	Channing Sanitarium,	Wellesley,	50	Chestnut blight thinning.
Cook, Martha, Heirs,	Chapin, C. H. B.,	Tolland,	300	Cutting and planting.
Curtis, Miss R. E., Brighton, Brighton,	Clark, A. B.,	Palmer,	25	Chestnut blight cutting.
Dexter, Mr.,	Cook, Martha, Heirs,	Stowe,	36	Cutting.
Durant, Clark T., Great Barrington,	Curtis, Miss R. E.,	Brighton,	1	Tree diseases.
Eastman, Chase, Newton, 6 Thinning and insects. Fall River, city of, South Park, Tree diseases. Fessenden, R. G., Concord,	Dexter, Mr.,	Blandford,	5	Insects.
Fall River, city of, South Park,	Durant, Clark T.,	Great Barrington, .	. 6	Thinning and planting.
Fessenden, R. G., Concord,	Eastman, Chase,	Newton,	16	Thinning and insects.
Fengstedt Bros.,	Fall River, city of,	South Park,	-	Tree diseases.
Fitzpatrick, T. B., Hopkinton, 50 Thinning, insects and diseases Thinning. Forant, Mrs.,	Fessenden, R. G.,	Concord,	40	Improvement thinning.
Forant, Mrs.,	Fengstedt Bros.,	Bedford,	20	Estimate.
Framingham Country Club, . Framingham, . 8 Cutting and thinning. Frothingham, Mrs. Channing, . Walpole, 46 Thinning. Frothingham, Randolph, Beverly Farms, Blister rust. Gay, George M.,	Fitzpatrick, T. B.,	Hopkinton,	50	Thinning, insects and diseases.
Frothingham, Mrs. Channing, . Walpole,	Forant, Mrs.,	Warren,	40	Thinning.
Frothingham, Randolph, Beverly Farms, Blister rust. Gay, George M., Hampden,	Framingham Country Club, .	Framingham, .	8	Cutting and thinning.
Gay, George M., Hampden,	Frothingham, Mrs. Channing, .	Walpole,	46	Thinning.
Geer, J. T., Three Rivers, . 30 Thinning and planting. Gillett, Edgar L., Westfield, 150 Estimate. Goodale, J. L., Ipswich, 10 Blister rust and planting.	Frothingham, Randolph,	Beverly Farms, .	-	Blister rust.
Gillett, Edgar L., Westfield, 150 Estimate. Goodale, J. L., 10 Blister rust and planting.	Gay, George M.,	Hampden,	75	Chestnut blight thinning.
Goodale, J. L., Ipswich, 10 Blister rust and planting.	Geer, J. T.,	Three Rivers, .	30	Thinning and planting.
	Gillett, Edgar L.,	Westfield,	150	Estimate.
Goodwin, Fred S., Dover, 185 Thinning.	Goodale, J. L.,	Ipswich,	10	Blister rust and planting.
	Goodwin, Fred S.,	Dover,	185	Thinning.
Hall, H. P., Sandisfield, 200 Planting.	Hall, H. P.,	Sandisfield,	200	Planting.

LIST OF FOREST EXAMINATIONS, 1917 — Continued.

NAME.	Town.	Area (Acres).	. Problem.
Heald, J. M.,	Lincoln,	20	Thinning and planting.
Healy, John J.,	Charlemont,	180	Cutting and improvement
Helburn, J. W.,	Williamsville,	190	thinning. Thinning and planting.
Hillside School,	Greenwich Village,	20	Cutting.
Homans, Mrs. John,	Canton,	10	Thinning and planting.
Johnson, Margaret,	East Freetown, .	70	Thinning and cutting.
Knittle, Fred,	Blandford,	50	Thinning.
Lawrence, H. H.,	Concord,	77	Thinning.
Leclear, Mrs. Gifford,	Brewster,	38	Thinning and planting.
Leonard, Fannie G.,	Raynham,	161/2	Reforestation.
Lowney, Walter M.,	Mansfield,	4	Weevil.
Loyd, Mrs. S. L.,	Williamstown, .	4	Estimate.
Ludden, Myron,	Spencer,	30	Cutting and estimate.
Lynch, J. C.,	Stockbridge,	70	Planting.
Marble, Frank E.,	Lynnfield,	20	Burn.
McSweeney, Edward F.,	Hudson,	6	Burn.
Meadowbrook Golf Club,	Reading,	10	Thinning.
Melbourne, Sydney J.,	East Longmeadow,	57	Cutting.
Melbourne, Sydney J.,	East Longmeadow,	75	Cutting.
Metropolitan Park Commission,	Blue Hills,	_	Blister rust.
Morse, Arthur M.,	Sudbury,	10	Thinning and planting.
Morton, Margaret B.,	Plymouth,	-	Shade trees.
Munroe, Elmer E.,	Wellesley,	3	Tree diseases.
Munson, W. A.,	Huntington,	50	Cutting and chestnut blight.
Newburyport Water Commis-	Newburyport, .	40	Thinning and planting.
sion. Newburyport, city of,	Newburyport, .	-	Tree diseases.
New England Kennel Club, .	Braintree,	40	Thinning and planting.
Nichols, Lesley A.,	North Reading, .	4	Thinning and spraying.
Norfolk State Hospital,	East Norfolk, .	25	Thinning and planting.
Osgood, Isaac,	North Andover, .	10	Thinning and estimate.
Packard, Martha W.,	Andover,	1	Spraying.
Palmer, Mrs. E. H.,	Reading,	6	Blister rust.
Parker, Charles H.,	Cotuit,	75	Thinning.
Peck, Robert E.,	Brimfield,	50	Blister rust.
Peters, William Y.,	Dover,	116	Thinning.
Phelps, James F.,	West Lynn,	1	Chestnut blight.
Phinney, F. F.,	Sturbridge,	200	Thinning and planting.
Pond, George K.,	Leyden,	80	Planting.
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List of Forest Examinations, 1917 — Concluded.

LIST OF TORE	51 EARMINATION	, 1011	C Gradianous,
Name.	Town.	Area (Acres).	Problem.
Prengle, Ralph,	North Reading, .	5	Thinning and spraying.
Richardson, Miss Clara,	Methuen,	14	Estimate.
Ross, John A., Jr.,	Newburyport, .	45	Thinning.
Sabin, Mr.,	Hadley,	22	Thinning.
Seavey, Herbert,	Stoughton,	80	Chestnut blight cutting.
Seymour, Mrs. S. P.,	Granville,	100	Estimate and type map.
Shaylor, W. M.,	Tyringham,	42	Estimate.
Shaylor, W. M.,	Warren,	83	Chestnut blight.
Shores, Harvey T.,	North Bernardston,	400	Thinning and planting.
Simpson, C. B.,	South Easton, .	41/2	Burn.
Skinner, Joseph A.,	South Hadley, .	25	Reforestation.
Smith, Irving,	Ashburnham, .	150	Estimate.
Smith, Frank B.,	Worcester,	250	General.
Snow, F. H.,	Conway,	50	Thinning and planting.
Stearns, Francis N.,	Adams,	-	Moths.
Stockbridge, town of,	Stockbridge,	53	Improvement cutting.
Swift Estate,	Wellesley Hills, .	10	Chestnut blight thinning.
Thompson, George M.,	Wakefield,	-	Aphis.
Wilkins, James H.,	Carlisle,	24	Thinning.
Williams, H. S.,	Springfield,	25	Cutting.
Windsor, S. S.,	Walpole,	1	Shade tree.
Woods, Nesbit L.,	Dunstable,	150	Cutting and planting.
Daniels, Caroline T.,	Medway,	30	Estimate.
Haven, F. S.,	Weston,	15	Thinning.
Hunt, Daniel,	Marshfield,	20	Thinning.
Keith, Harry,	East Bridgewater, .	4	Blister rust.
Newburyport, city of,	Newburyport, .	- 1	Tree diseases.
Parmenter, H. F.,	Wayland,	8	Estimate.
Pearson, Gardner W.,	Dracut,	80	Reforestation.
Plymouth Water Works,	Plymouth,	20	Thinning and planting.
Spencer, Geo. P.,	Oakham,	60	Thinning.
Weld, Stephen M.,	Dedham,	50	Blister rust.
Wheeler, William,	Concord,	16	Cutting.
Total (104 examinations), .		5,308	





One of the tracts turned over to the State Forester and planted under the reforestation act, showing the young white pine trees just beginning to free themselves through the grass and weeds.



A photograph taken just three years later of the same plantation as above. This view was taken from the field on the left in the above view looking on to the hill (Christian Hill, Colrain).

REFORESTATION.

The number and area of plantations deeded to us under the terms of the reforestation law exceeded those of last year, and is well up to the average of previous years when the lots which were purchased are deducted from the total. The amount of caretaking work done on plantations of previous years was about the same as that done in 1916. The tables give this information in detail. The small motor truck which we purchased last fall was of great assistance in transporting men and trees, and enabled us to do more work with fewer men, an important consideration in these times of labor shortage. Several of our plantations showed an unusual number of trees affected by pine weevil. During the summer we used two crews of men making a tree-to-tree inspection of these plantations and cutting and burning the infested shoots. Experiment has shown that if this method is followed for two or three years the weevil can be controlled in great part.

NEW WORK.

[S. p.=Scotch pine; w. p.=white pine; r. p.=red pine; s.=spruce; A. p.=Austrian pine.]

Num- ber.	NAME.	•	Town.			Area (Acres).	Trees planted.	Acres brushed.
134 133	Crocker, . Simpkins, .	: :	Barnstable, Yarmouth,	:		32 12	15,000 S. p. 7,500 S. p. 7,500 w. p.	321 12
136	French, .		Rutland, .			26	9,000 w. p.	-
137	Wire company,		Spencer, .			8	9,000 r. p. 4,500 w. p. 4,500 s.	-
139	Perry,		Falmouth,			18	1,750 A. p. 1,750 S. p.	9
140	Snow,		Conway, .			74	21,000 w.p.	-
141	Pond,		Leyden, .			61	22,000 s. 20,000 w. p. 20,000 s.	-
143 144	Town, Flint,	: :	Berkley, . Andover, .			12 6	2,000 w. p.	12
145	Schoonmaker,		Ashburnham,			38	2,000 A. p. 15,000 w. p. 5,000 s.	-
							9,000 r. p. 5,000 A. p.	
147	Geer,		Belchertown,			6	3,000 w. p. 3,000 A. p.	-
148	Sills,		Shelburne,			33	13,000 M. p. 13,000 w. p. 10,000 s.	_
150	Estabrook, .		Fitchburg,			7	-	42
151 124	Estabrook, . Hansen, .		Lunenburg, Marlborough,		•	6 95	18,000 w. p.	2 8
122	Hansen, .		mariborough,	•	•	30	14,000 r. p.	20
135	Smith, .		Barnstable,			10	4,000 S. p.	10
	Totals, ,					445	-	140

¹ Thirty cords of wood were taken out.

² Twenty cords of wood were taken out.

^{*} Twenty-five cords of wood were taken out.

MAINTENANCE WORK.

[W. p.=white pine; A. p.=Austrian pine; N. s.=Norway spruce; r. p.=red pine.]

Num- ber.	Name			Town.	Area (Acres).	Trees planted.	Acres brushed.	Trees from which Weevil was taken.
1	Fenno, .			Westminster, .	40	-	_1	150
7	Flint, .			Andover, .	40	10,500 w. p. 1,000 A. p.	-	-
13	Wilson, .			Spencer,	51/2	-	5½	337
12	Wilson, .			Spencer,	23	-	-	463
11	Wilson, .			Spencer,	45	-		1,405
20	Eames, .			Paxton,	55	-	-	1,704
25	Sohier, .			Rowley,	8½	1,000 w. p.		-
27	Greenwood,	**		Gardner, .	93	-	-	4,000
30	Cowles,			Belchertown, .	· 10	-	10	150
43	Barr, .			Spencer,	-	-	-	56
44	Clark, .			Holden,	-	-	-	250
45	Stone, .			Brookfield, .	-,	-	-	520
46	Fullam, .		٠	West Brookfield,	115	9,000 N. s. 5,000 w. p.	-2 30	-
52	French, .			Hubbardston,	40	-	40	-
59	Bolton, .			Shirley,	20	<u>•</u>	.20	-
73	Walworth,			Barre,	35	-	25	-
81	Glazier, .			Leverett, .	24	-	24	-
82	Glazier, .			Leverett, .	66	-	66	-
112	Perry, .	٠		Medfield, .	12	1,000 r. p. 1,000 w. p. 500 N. s.	<u>-</u>	-
114	Tower, .			Manchester, .	4	500 w. p.	-	-
119	Browne,			Marlborough, .	33	6,000 w. p.	14	-
91	Rice, .			Spencer,	200	-	-	4,355
75	Robertson,			Oakham, .	85	-	-	587

¹ Thirty cords of wood were taken out.

NURSERY WORK.

No important changes were made in our nursery work during the year. Our three principal nurseries at Amherst, Barnstable and the State Farm were continued as usual. The shipments of stock for planting on our own lands were somewhat greater than

³ One hundred and sixty cords were taken out.

in the previous year, while the demands for stock by agencies outside of our department were considerably less. The amount of transplanting at Amherst and Barnstable was about the same as last year, but the transplanting work at the State Farm was very considerably restricted by the lack of two-year seedling stock. Some transplants were set out at the auxiliary nurseries at the Myles Standish State Forest and at Norfolk State Hospital, but no more stock was transplanted at the Otter River State Forest. In spite of advancing labor costs the nursery expense was about the same as last year, and considerably less than two years ago. The outstanding feature of our nursery situation at this time is the immense number of four-year transplants, nearly 2,000,000, which we have on hand for use next spring. As this number is double the number required for our own needs we have decided to make use of the privilege granted to us by law to sell this stock at cost to private owners, under certain restrictions approved by the Governor and Council. We will also have on hand more than the usual number of two-year seedlings ready for transplanting.

STOCK SHIPPED FOR PLANTING ON REFORESTATION LOTS.

Nu	RSE	RY.		Species.	Species.				Class.					
Amherst,				White pine, .			3-year, .				15,000			
Amherst,				White pine, .			4-year, .				158,325			
Amherst,				Red pine, .			4-year, .				44,000			
Amherst,				Austrian pine,			4-year, . ·				8,000			
Amherst,				Norway spruce,			3-year, .				10,000			
Amherst,				Norway spruce,			4-year, .				55,350			
Amherst,				Scotch pine, .			4-year, .		4		9,000			
Total,											299,675			
Barnstable,				White pine, .			4-year, .				20,400			
Barnstable,				Scotch pine, .			4-year, .				750			
Barnstable,				Red pine, .			4-year, .				3,000			
Barnstable,				Austrian pine,			4-year, .				1,000			
Barnstable,				Norway spruce,			4-year, .				22,950			
Total,											48,100			
Grand to	tal,										347,775			

STOCK SHIPPED FOR PLANTING ON STATE FORESTS.

Nursery.	Species.	Class.	Num- ber.	State Forest.
Barnstable,	White pine,	4-year,	29,000	Myles Standish.
Barnstable,	White pine,	4-year,	7,000	Otter River.
Barnstable,	White pine,	4-year,	3,000	Harold Parker.
Barnstable,	Red pine,	4-year,	9,600	Myles Standish.
Barnstable,	Red pine,	4-year,	7,000	Otter River.
Barnstable,	Red pine,	4-year,	3,000	Harold Parker.
Barnstable,	Scotch pine,	4-year,	5,700	Myles Standish.
Barnstable,	Austrian pine, .	3-year,	10,000	Myles Standish.
Barnstable,	Austrian pine, .	4-year,	5,000	Myles Standish.
Barnstable,	Norway spruce, .	4-year,	10,500	Myles Standish.
Barnstable,	Larch,	3-year,	11,000	Myles Standish.
Total,			100,800	
Myles Standish, .	Scotch pine,	3-year,	10,000	Myles Standish.
Amherst,	White pine,	4-year,	15,000	Otter River.
Amherst,	White pine,	4-year,	16,000	Savoy.
Amherst,	Red pine,	4-year,	5,000	Otter River.
Amherst,	Larch,	2-year,	13,000	Otter River.
Amherst,	Norway spruce, .	4-year,	6,000	Savoy.
Total,			55,000	
Grand total, .			165,800	

STOCK SHIPPED TO SUBNURSERIES.

Nurse	RY.	Species.		Clas	3.		Num- ber.	Subnursery.
Barnstable,		White pine, .	2-year,				25,000	Myles Standish.
Barnstable,		White pine, .	2-year,				5,000	State Farm.
Barnstable,		White pine, .	2-year,				25,000	Norfolk Hospital.
Barnstable,		Scotch pine, .	2-year,				107,000	Myles Standish.
Barnstable,		Scotch pine, .	2-year,				46,000	State Farm.
Barnstable,		Scotch pine, .	3-year,				60,000	Myles Standish.
Barnstable,		Austrian pine,	2-year,				15,000	State Farm.
Barnstable,		Norway spruce,	2-year,				44,200	State Farm.
Total,						•	327,200	

STOCK SHIPPED OUTSIDE DEPARTMENT.

Consigner.	Address.	Species.	Class.	Number.	Nursety.
Barnard, J. H.,	Greenbush,	. Hemlock,	4-year,	200	Amherst.
		White pine,	4-year,	1,500	Barnstable.
		Scotch pine,	4-year,	200	Barnstable.
		Red pine,	4-year,	200	Barnstable.
		Norway spruce,	4-year,	200	Barnstable.
Concord Water Board,	Concord,	. White pine,	4-year,	1,500	Amherst.
		Red pine,	4-year,	1,500	Amherst.
		Norway spruce,	4-year,	200	Amherst.
Cushing, C. W.,	Lunenburg,	White pine,	4-year,	22,500	Amherst.
		White pine,	4-year,	5,000	Barnstable.
Fish and Game Commission,	Martha's Vineyard,	. White pine,	4-year,	10,000	Barnstable.
		Austrian pine,	4-year,	2,000	Barnstable.
		Red pine,	4-year,	2,000	Barnstable.
Haskins, F. L.,	Norwell,	. Assorted,	4-year,	2,100	Barnstable.
Gardner Colony,	Gardner,	White pine,	4-year,	3,000	Amherst.
		Norway spruce,	4-year,	3,000	Amherst.
Lutheran Home,	Avon,	. White pine,	4-year,	1,000	Barnstable.
Massachusetts Agricultural College,	Amherst,	Assorted,	4-year,	200	Amherst.
McSweeney, E. F.,	Hudson,	. White pine,	4-year,	2,000	Amherst.
Metropolitan Park Commission,	Blue Hills,	. White pine,	2-year,	200,000	Amherst.

STOCK SHIPPED OUTSIDE DEPARTMENT - Concluded.

CONSIGNES.			Address.	Species,		Class.		Number.	Nursery.
Metropolitan Water Board, .			Fayville,	White pine,	2-year,			50,000	Barnstable.
Moth superintendent,		•	Bolton,	White pine,	4-year, .			3,000	Amherst.
Moth superintendent,		•	Harvard,	White pine,	4-year,			3,000	Amherst.
Moth superintendent,		•	Hudson,	White pine,	4-year,			3,000	Amberst.
Norfolk Hospital,		•	East Norfolk,	White pine,	4-year,			6,000	Barnstable.
				Red pine,	4-year,			1,000	Barnstable.
				Norway spruce,	4-year,			200	Barnstable.
Parkhurst, C. W.,		٠	Foxborough,	Norway spruce,	4-year,			2,000	Barnstable.
Park board,		•	Plymouth,	Assorted,	4-year,			1,000	Barnstable.
Park board,		٠	Swampscott,	White pine,	4-year,		•	1,500	Barnstable.
				Scotch pine,	4-year,		•	200	Barnstable.
Peirce, E. R.,		٠	Wellesley,	White pine,	4-year,			15,000	Amherst.
Smith School,		٠	Northampton,	White pine,	4-year,		•	200	Amherst.
Spring, Russell,		٠	Newton,	White pine,	4-year,		•	1,000	Amherst.
State sanatorium,		·	Westfield,	Red pine,	4-year, .			200	Amberst.
				White pine,	4-year,		•	200	Amherst.
Water works,		•	Hudson,	White pine,	4-year,		•	13,000	Amberst.
				Larch,	4-year,			300	Amherst.
Water board,	•	•	Newburyport,	Norway spruce,	4-year,		•	2,000	Barnstable.

Totals for Amherst, 274,800; for Barnstable, 98,600; grand total, 373,400.

INVENTORY OF STOCK, STATE FOREST NURSERIES, 1917. Barnstable.

Speci	ES.	5-Year Trans- plants.	4-Year Trans- plants.	3-Year Trans- plants.	2-Year Seedlings (Beds).	1-Year Seedlings (Beds).
Red pine,		 -	150,000	180,000	_	_
White pine, .		 20,000	200,000	350,000	225	150
Austrian pine, .		 -	10,000	-	_	_
Arbor vitæ, .		 	25,000	-	_	_
Fir balsam, .		 -	15,000	-	_	_
Spruce,		 3,000	50,000	-	58	20
Scotch pine, .		 -	-		40	-
Banks pine, .		 -	-	-	-	18
Larch,		 -	-	-	6	
Totals,	٠	 23,000	450,000	530,000	329	188
		An	nherst.			
White pine, .		 -	833,000	166,000	195	160
Red pine,		 _	23,000	2,000	18	-
Scotch pine, .		 -	62,500	192,000	-	72
Austrian pine, .		 -	_	25,000	-	_
Yellow pine, .		 -	_	42,000	_	_
Loblolly pine, .		 -	_	_	-	2
Banks pine, .		 -	_	_	-	5
Arbor vitæ, .		 -	4,000	-	-	_
Hemlock,		 -	2,000	-	-	-
Norway spruce, .		 -	-	275,000	9	-
Totals,		 -	924,500	702,000	222	239
		No	rfolk.			
White pine, .		 -	25,000	25,000	65-	-
		Otter	River.			
White pine, .		 -	140,000	-	-	~
		Myles	Standish.			
Scotch pine, .		 -	-	150,000	-	-
White pine, .		 -	-	25,000	-	-
Total,		 _	-	175,000	-	-

INVENTORY	OF	STOCK,	STATE	FOREST	Nurseries,	1917 — Concluded.
				State Far	m.	

Spe	CIE	s.		5-Year Trans- plants.	4-Year Trans- plants.	3-Year Trans- plants.	2-Year Seedlings (Beds).	1-Year Seedlings (Beds).
White pine,				-	_	50,000	_	-
Scotch pine,				-	760,000	27,000	-	-
Austrian pine,				-	3,700	12,000	-	-
Norway spruce,				-		40,000	-	-
Totals, .				-	763,700	129,000	-	-
Grand total	8,			23,000	2,300,000	1,560,000	550	427

STATE FOREST ADMINISTRATION.

Although the law puts the care and administration of the State forests in the hands of the State Forester, he has no appropriation for this purpose, so that by arrangement with the State Forest Commission such funds as the forestry branch can spare are expended on the Otter River State Forest, while the Commission uses some of its funds on the other State forests,—the Myles Standish, Harold Parker and Savoy Mountain.

Otter River State Forest. — During the past year we have reforested 60 acres of land and cleared of brush and small wood about 70 acres additional. The expenditure of \$1,600 is only about one-half that of the previous year. Although there is very little valuable cordwood on this reservation, our men have been cutting gray birch fuel wood in order to aid in the local fuel supply. The present time is an excellent one in which to dispose of this wood, which under ordinary circumstances is not salable.

We have asked Mr. Haynes, engineer for the State Forest Commission, to give us a brief outline of the work done on the other State forests by the State Forest Commission under his supervision, and his statement here follows:—

Up to Nov. 30, 1917, there have been acquired by purchase by the State Forest Commission, under the Acts of 1914, chapter 720, approximately 11,000 acres of land comprising four separate State forests, as follows:—

1. The Otter River State Forest (1,700 acres), situated in the townships of Winchendon, Royalston and Templeton, in Worcester County. 2. The Myles Standish State Forest (7,000 acres), situated in the townships of Plymouth and Carver, in Plymouth County.

3. The Harold Parker State Forest (1,100 acres), situated in the townships of Andover, North Andover and North Reading, in Essex and Middlesex counties.

4. The Savoy State Forest (1,200 acres), situated in the township of Savoy, in Berkshire County.

These State forests are comprised to a considerable extent of waste land, and the act calling for its acquisition had for its main object the reclamation of waste land areas, i.e., the gradual substitution of stands of forest trees of value to replace the worthless growth now covering a certain percentage of the area of all four forests. The State Forester is under the law given control and management of these tracts, and is charged with the responsibility of the proper prosecution of the necessary reclamation work that should be and must be done if the objects for which these tracts are being acquired are to be achieved and the values possible of being secured in the future are to become tangible. Owing to the fact that the State Forester has no fund available with which to prosecute the needed work to any material extent, it has again been necessary for the State Forest Commission to expend a portion of its funds during the past year in planting and protective and improvement work.

The State Forest Commission during the past year planted on the Myles Standish State Forest 232,000 plants, consisting of red, Scotch, Austrian and white pine, and Carolina poplar, to all of which plants the section is well adapted; also 102,000 seedlings were set in a nursery on the reservation, several miles of roads were cleared, fire equipment purchased, and a camp suitable for caring for twenty-five men was fitted up. On the Otter River State Forest the fire lines were replowed and some improvement work was done on the buildings on the reservation. On the Harold Parker State Forest and Savoy State Forest a total of about 30,000 pine and spruce transplants were set. With the exception of 40,000 poplars all of the transplants and seedlings were furnished from the nurseries of the State Forester. The plants in all cases have done well, and the percentage of those alive in the fall of 1917 will run over 95.

During the past three years there has been expended by the Commission on the State forests along such lines as planting, fire protection, equipment, and improvement work, approximately \$8,560.

Expenditures for 1917 on State Forests.

In accordance with the provisions of section 3, chapter 720, Acts of 1914, the State Forester herewith gives a statement of the expenditures on each State forest for the past year.

			•				
Otter	River	Stat	te Fo	rest.			
Surveying,						٠.	\$373 68
Planting, 1							934 32
Brush cleaning,							788 58
Brush cleaning, House and miscellaneous exper	nses,		•				279 82
Nursery work,							111 00
Land purchase,							10 85
,							
							\$2,498 25
Sa	oy St	tate i	Fores	ŧ			\$2,100 20
							\$145 05
Planting, 1	•	•		·		•	240 32
Land purchase,	•	•	•			•	6,051 59
Land purchase,	•	•	•	•		•	0,051 59
							ec 400 00
77 1.3	D7.	O	tal. 1	7			\$6,436 96
Harold		er si	tate 1	ores	τ.		#404 04
Surveying,	•	•	•	•		•	\$496 91
Planting, 1	•	•	•	•		•	108 44
· Land purchase,	•	•	•	•		, •	291 12
***		~					\$896 47
Myles S		sh S	tate.	t'ores	it.		
Brushing,	•	•	•	•		•	\$24 50
Surveying,	•	•					93 00
Fire lines and roads,	•	•		•			1,105 88
Planting, 1							2,849 50
Nursery,							337 00
Miscellaneous account,		•					683 10
Land purchase,							35 45
							\$5,128 43
FINAN	CIAL	STA	TEM	ENT			
Company I			J 7.7.				
General F	orestr	y an	a ivi	urser	ies.		
Appropriation for 1917,	•	•	•	•			\$20,850 00
Expenditures: —							
Salaries,	•	•	•	•	\$8,412		
Travel,					2,777	20	
Printing,					433		
Stationery and postage, .					45		
Maps, photos, etc.,					2	98	
bullaries,					573	06	
Supplies and equipment,					. 122	72	

¹ Figures on planting include price of trees furnished from the State Forester's nursery.

Nursery: —												
Pay roll,									\$7,165	86		
Travel, .									4	91		
Seeds and	seedl	ings	, .						590	30		
Teams, fre	ight :	and	expre	ess,					330	68		
Equipment									299	52		
Telephone									90	45		
											\$20,848	93
D 1	,	,	, ,		3.7		0 10					_
Balance	retur	nea	to tre	easu	ry N	ov. 3	0, 19.	17,		٠	\$1	07
	7	Dama	hass	an d	Dlam	tim a	of E		Tando			
				ana	run	ung	OJ F	oresi	Lands.			
Appropriation	a for	191	7,	٠	•	٠	•	•		•	\$10,000	00
Expenditur	- 29°											
Pay roll, .									00.000	00		
									** 63H	3h		
Land.							•	•	\$8,630			
Land, .									182	50		
Travel, .									182 303	50 39		
Travel, . Express, freig	tht ar	nd t	eams		•				182 303 313	50 39 07		
Travel, . Express, freig Equipment,	tht an	nd t	eams	· · · · · · · · · · · · · · · · · · ·		•			182 303 313 488	50 39 07 44		
Travel, . Express, freig Equipment, Postage, .	tht an	nd t	eams	, .	•				182 303 313 488 20	50 39 07 44 00		
Travel, . Express, freig Equipment, Postage, . Printing, .	tht an	nd t	eams	, .					182 303 313 488 20 18	50 39 07 44 00 20		
Travel, . Express, freig Equipment, Postage, .	tht an	nd t	eams	, .					182 303 313 488 20	50 39 07 44 00 20	9,988	41
Travel, . Express, freig Equipment, Postage, . Printing, .	tht an	nd t	eams	, .					182 303 313 488 20 18	50 39 07 44 00 20	9,988	41

MOVING PICTURE REELS.

The three films owned by the department, each demonstrating different phases of our work, namely, (1) reforestation and nursery work, (2) forest fire work, and (3) suppressing gypsy moths, have been utilized for many special occasions during the year, both in Massachusetts and in exchange with other States. At the present time duplications are being made by the war department from these films for interesting our soldiers in the field in the work.

CREOSOTING GYPSY MOTH EGG CLUSTERS.

Year by year finds us perfecting our methods and always ready to try new methods. The fact that labor is scarce, and equipment and finances harder to get, makes us practice every economy possible. Realizing the high cost of spraying material, and that the coming season will test our every energy, the

division moth men were called in to a conference, and we decided that a definite drive be made on curtailing every cent possible in the creosoting work this fall and winter, that the money thus saved might be used for spraying.

The creosoting of egg clusters is a proper remedy, and where judiciously done is very effective. The great trouble is that it may be overdone, as there is a danger of expending too much labor in this work. If one is depending solely upon creosoting to keep the gypsy moth in check he may be justified in a greater expenditure, but if, as is more commonly practiced, the trees are to be sprayed, the amount of creosoting necessary will depend entirely upon how bad the conditions are. The local moth superintendent should be able to advise on this matter. The practice of climbing trees and treating with creosote is largely eliminated, as the method is expensive. It should not be said dogmatically that this should never be done, however, for there are times when it is advisable. A good moth superintendent or forester must use his judgment at such times. Results are desired, but economy must be considered in getting them. Quick and effective so-called ground work, wherein the expense is kept low per acre, may be advisable, but the timekilling and painstaking practices of the past in tearing down stone walls and looking into every crevice with reflecting mirrors are out of date. Creosote, therefore, is only a means to an end, and better and more effective practice in suppression is spraying with arsenate of lead. Caterpillars are bound to eat, and poisoning them is sure to get effective results.

AUTO-TRUCK SPRAYERS.

The three new auto-truck sprayers that were built for this department proved, as was anticipated, to be great factors in our work the past season, enabling us to accomplish what otherwise would have been practically impossible. These sprayers were used almost entirely upon the highways and to supplant the horse-drawn sprayers that have been in use heretofore. In order to get the greatest amount of good out of them a regular route was outlined in advance for each outfit. A crew of three to accompany each, a mechanic and driver combined and two nozzle men, was selected, who remained with the machine throughout

the spraying season. This crew was under direct charge of the division moth men while within their respective territories. The crew was provided with a camping outfit which was used provided other arrangements could not be easily planned for. Without explaining more in detail, the great advantages can readily be seen for the use of this equipment. The motor power for quick and effective work as compared to horse-drawn sprayers is self-evident. The auto truck requires but one man. an engineer and chauffeur combined, while a horse-drawn power sprayer requires two men, - an engineer and a driver. With the plans perfected for the work, water available and plenty of spraying material on hand a great amount of territory can be covered each day. The great drawback that must be encountered, however, is the inclement or rainy weather. The past season's plans were greatly interfered with, and the sprayers were unable to keep on schedule time for this reason. The United States government has four of these auto-truck sprayers in use, and are building three more. A photograph of one of our sprayers at work is shown in this report. The spraying attachments are easily removed, and the truck may be used for other purposes after the spraying season. Already a few cities and towns have truck sprayers. The question of their practicability and economy rests with the amount of work to be done, particularly the kind of work that requires a large amount of travel, like roadside spraying. Where this is not necessary a horse-drawn sprayer will do equally good work at less expense.

Moth-thinning Work.

During the past year the division of this department, which originated the moth-thinning work, has finally so broadened as to embrace the whole field of forestry operations and forest utilization. When the work was started as a separate branch of the department, nearly five years ago, the need was for public education in the value of moth thinnings as a means of moth control, and for practical demonstration of the efficacy and financial success of these thinnings. That stage has now completely passed. Moth thinnings have come into almost universal practice throughout the infested region. They are paying for themselves in most cases, saving a large expenditure

of money which would go in other means of moth control, and are bringing into use a considerable amount of forest material which would be wasted if not cut in thinnings.

A great opportunity is now before us. The years of patient education along forestry lines, added to the present unequaled demand for forest products of all kinds, have opened the minds of the woodland owner to the idea of conservation. along lumbering and utilization lines now has a chance to make good. The waste and desolation following the usual lumbering operations have brought about a reaction. The ravages of the gypsy moth and the chestnut blight, together with the potentialities of the pine blister rust, have made the forest owners wish to take account of stock and look toward the future. They want to operate conservatively, and to keep the forest land productive if they can see that it pays. It is our idea that if forestry does not pay 100 cents on a dollar plus interest, then it is no good. We know that it pays. We hope to take advantage of our opportunity and prove that it pays. moth-thinning work has developed into what might be called a forestry operating work. We are willing to co-operate with any person who wishes to cut his woodland conservatively, under practically the same terms as those under which the moththinning operations have been carried on; that is, the owner furnishes the capital and we supervise the operation and dispose of the product without charge except for traveling expenses.

During the past year, to help the moth-thinning branch of the department in its war and operating work, the forestry branch has undertaken to make practically all preliminary examinations, whether forestry or moth examinations. If the examinations developed so that further help or advice along operating or utilization lines was necessary, then the moth-thinning branch was called in. This management has resulted in a great saving of time and standardization of advice given. During the past year 22 new examinations covering 2,208 acres were made by the moth-thinning branch. Besides that about 40 examinations were made as called upon by the forestry branch.





A plantation of white pine on poorer or gravelly soils about rich bog lands, typifying the ideal conditions for cranberry bogs; hardwoods, the natural food of gypsy moths, replaced by pine, which is ten times as valuable and flourishes in light soils, — a solution of the moth trouble about cranberry bogs.



A typical example showing how young white pine trees may be utilized to fill in open and barren spaces in forests. These trees have been set out only three years, and are well established (Ashburnham).

REPORT OF DR. L. O. HOWARD, UNITED STATES ENTOMOLOGIST.

DEC. 19, 1917.

Prof. F. W. RANE, State Forester, State House, Boston, Mass.

DEAR PROFESSOR RANE: — I enclose a report on the parasite situation, which you are at liberty to use in your annual report.

Following my report to you of a year ago, I am now sending you a statement as to the conditions of the parasites which in earlier years have been imported under the joint effort of this Bureau and the State of Massachusetts in the effort to control the gypsy moth and the browntail moth. I have not had the opportunity during the past year to visit the parasite laboratory, except once in the early spring, and the paragraphs which follow are taken from a report on present conditions submitted to me by Mr. A. F. Burgess of this Bureau, in charge of the moth work.

The parasite work has been continued along similar lines as in the past few years. It has not been possible to introduce parasites from abroad owing to war conditions in Europe. Colonization of the parasites already introduced over the entire territory infested by the gypsy moth is being attempted, and several of the species are now established in practically all the infested area in Massachusetts.

The egg parasites, which spread much slower than some of the strong flying species, have been given special attention the past year as far as colonization is concerned.

Anastatus bifasciatus was colonized in 46 towns in Massachusetts during the spring of 1917, 1,722 colonies having been liberated. This species has become well established in most of the colonies previously placed in the field. Collections from colonies liberated in 1910 and 1911 have been examined, and the parasitism was found to range from 30 to 41 per cent.

Schedius kuvanæ was collected in a few places in Massachusetts in October and November, as most of the stock available this year was used in Maine and New Hampshire. Over 200,000 specimens were liberated, most of them being placed in woodland in Norfolk.

The parasitism by this species in old colonies has been gradually increasing during the last two years, and many collections this fall have shown that over 30 per cent. of the eggs were destroyed by this parasite.

Apanteles melanoscelus, the hymenopterous species which attacks the gypsy moth caterpillars, was found more abundant this year than heretofore, and it was possible to liberate several new colonies. Only a small number of individuals of this species were originally introduced, and considerable more work must be done in colonizing it throughout the infested region.

Compsilura concinnata was not as abundant generally as heretofore, although in some localities it caused very heavy inroads on the increase of the gypsy moth.

Blepharipa scutellata, a tachinid parasite which was introduced a number

of years ago, and which has never been found in the field in large numbers, was recovered from several localities in eastern Massachusetts this year. From some of the collections of gypsy moth pupæ that were made a very high percentage of parasitism resulted, and it is hoped that this species will continue to increase.

The Calosoma beetle was slightly more effective this year than during the previous year. Extreme abundance of the species, however, was local rather than general. In some localities large numbers were present, and this resulted in the destruction of many gypsy moth caterpillars and pupæ.

The brown-tail moth was much less abundant this year then heretofore, and very few localities are known at the present time where the infestation is at all serious. Collections of webs were made during the winter and many caterpillars dissected. This work resulted in showing a very high percentage of parasitism. Breeding records during the spring and summer gave similar results.

Zygobothria nidicola was reared in large numbers from some of these collections, and this parasite was found over a much wider area than had been previously recorded.

The results of the work are encouraging, but the problem is complex and requires a large amount of investigation and study.

Yours most truly,
L. O. Howard,
Chief of Bureau.

GYPSY MOTHS AND CO-OPERATIVE CRANBERRY WORK.

This work has continued as heretofore in the cranberrygrowing sections of the State. The same method of State aid has been followed that is in vogue in general moth work. The town first expends its liability, and each bog owner is assessed for his individual liability. These funds are first spent before any reimbursement can be expected from the State. The understanding is that when any co-operative work is done about a bog, thereafter the bog is to be kept in condition by the owner without future assistance from the State. The cleaning of the shores about bogs is being quite universally practiced, and is of great assistance in keeping the crawling larvæ from reaching the bogs after they have stripped the surrounding woodlands. The spread of the very young larvæ by the wind is best overcome by spraying the vines with arsenate of lead. It has been reported by Mr. J. J. Walsh, the Wareham superintendent, that effective results against the moths were secured this year by flooding the bogs when the moths are in the pupa stage.

PASTE V. POWDERED ARSENATE OF LEAD.

The paste form of arsenate of lead is and has been the standard insecticide in our campaign against the gypsy moth for years. It has the proper spreading and adhesive qualities upon the foliage, mixes readily in water, and does not burn the foliage. This insecticide was the creation of the old Massachusetts moth department of the Board of Agriculture, and was given to the world unpatented. It is now probably the standard arsenical insecticide in use, even supplanting Paris green.

During recent years a new form of arsenate of lead has gradually come into use. This is the powdered, or dry, lead. At first, like nearly every new undertaking, this proved unsatisfactory, probably the greatest objection being its tendency to burn the leaves. It did not adhere to the foliage as well as the paste, and then, again, some trouble was experienced in keeping it sufficiently dry. A still further claim that the powdered form was much cheaper for the ingredients it contained did not prove true on analysis. This was, of course, a further consideration. The objectionable features of the dry lead, however, have gradually been done away with, and last season many of the cities and towns used more or less of it, and are planning to do so the coming season. One city forester is so well pleased with the dry form that he is using one-third dry to two-thirds paste next season.

The State Forester is in no way prejudiced in this matter, and only desires that in changing from a well-tested and satisfactory insecticide to a new one no mistakes are made. While we have not tested out all of the brands of dry arsenate, we are still convinced that there is much that should be known before recommending them for general use. This whole subject will be given more careful consideration and observation the coming season. Considering the bulkiness and extra expense of handling the 50 per cent. water in the paste lead, it is well worth determining whether we can use the dry lead to good advantage.

MEETING OF GYPSY MOTH OFFICIALS AT THE STATE HOUSE.

On March 15 a meeting of the gypsy moth officials of the State was held at the State House at the call of the State Forester, and it proved one of the largest gatherings of these men that has ever been assembled. Every phase of the moth work was discussed by various speakers. The convention was honored by an address by His Excellency, Lieutenant-Governor Calvin Coolidge. The State Forester reviewed the work of the year. Mr. Burgess and Mr. L. H. Worthley, representing the United States government, discussed the parasitic work and the methods of handling the spread of the moths. Prof. W. D. Clark of Amherst gave a talk on correspondence courses and their value to practical workers. Paul D. Kneeland spoke on the subject of moth-control methods by practical forestry utilization. Mr. J. G. Gordon of Lowell discussed methods of interesting property owners in the work. There was plenty of time for an open discussion which was general, and the day was well spent. The attendance was over 200.

MEETING OF TOWN OFFICIALS AND MOTH SUPERINTENDENTS AT BOURNE.

The moth officials of the whole Cape country, including also the towns of Plymouth, Carver, Middleborough, Lakeville and Marion, were called together in Bourne at the town hall on Wednesday, September 19. They were authorized to invite their selectmen and any other citizens likely to be interested to attend. The day was spent in the discussion of the whole moth question, with particular emphasis upon the district under consideration. Besides the State Forester, Mr. Walter F. Holmes, the new district moth superintendent, spoke relative to future plans; also Assistant Forester Paul D. Kneeland outlined the work in progress in forest thinnings and utilization of tree growth and its relation to moth work, and Mr. George Smith discussed the question of equipment for spraying. It is hoped that a better understanding of the aims and purposes of the work may have resulted as the outcome of this meeting. It is desired that the coming season may also result in more cooperation than ever. The State Forester certainly desires to render every possible service to this section the coming season.

SPECIAL MOTH WORK AT NANTUCKET.

During the past season the citizens of Nantucket and the summer people became very much exercised over the prevalence of insect pests on the island, particularly on their shade trees

in the residential sections of the town. A tussock moth outbreak, the second within a few years, together with a gradual increase of the gypsy moth, due to slack methods of control. occurred last summer, threatening the tree life of the island. The presence of these hordes of caterpillars aroused the interest of the town in general, and, at an invitation extended by the board of selectmen and the Improvement Association, the State Forester made an investigation of conditions on the island and addressed a public meeting at which the chairman of the board of selectmen presided. Later a special town meeting was held. at which time a special appropriation was made, and the State Forester was asked to supervise the work. The appropriation was made at too late a date to do a great amount of work this fall; however, a thorough inspection of the trees was made by Mr. Smith and Mr. Fitzgerald of this department, and a few men were instructed to do the necessary creosoting of egg clusters. Plans were also perfected for additional spraying machinery for use next spring, and a beginning was made upon treating tree cavities, of which there are many needing attention.

Nantucket people are alive to the seriousness of the situation, and it remains for the State Forester to get results. He feels sure these can be accomplished through the splendid co-operation of the committee appointed to assist him. The work will be taken up again next spring and pushed vigorously to completion.

CHESTNUT BLIGHT.

There is nothing new to be said about this disease other than to emphasize what has already been stated. The disease is apparently as virulent as ever. When riding on the train from Boston to Pittsfield in August, a time when the conditions were just right to show its development, the woodlands exhibited a peppered condition of either dead or dying chestnut everywhere. The problem is one of utilization and rebuilding the forest stand with some other species. Much of the chestnut wood has been cut for poles, ties and cordwood during the year, and fortunately the markets have been good for handling it. Under ordinary times the cordwood would have been practically worthless.

THE STATE FIRE WARDEN'S REPORT.

Mr. F. W. RANE, State Forester.

Sir: — In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year.

The season of 1917 has been a comparatively favorable one from the standpoint of forest fire protection. The rainfall for the season was slightly above normal, and, with the exception of the months of July and November, was quite equally distributed throughout the year. During November the precipitation was 63/100 of an inch, the lowest record for this month in one hundred and five years, the drought lasting over a period of twenty-two days. In spite of favorable climatic conditions throughout the greater part of the season there has been an increase in the number of fires reported over the record of last year. However, through the efficient work of our observers, together with prompt co-operation on the part of the town and district forest wardens, we have experienced no disastrous fires, and the property damaged is slightly lower than that of a year ago.

Owing to the resignation on July 1 of Mr. Oscar L. Noyes of Byfield, Mass., district forest warden of the first district, the work in that district for the balance of the fiscal year has been carried on by the locomotive inspectors. It has seemed best in the interests of increased efficiency, without additional expense, to redistrict the State, adding one new district and making the division along county lines. In connection with the rearrangement of districts, and for the same reason of increased efficiency, a change has been made in the method of locomotive, portable sawmill and steam-roller inspection. Through an agreement with the Public Service Commission and the several railroads throughout the State we have received permission to assign the locomotive inspection work to the district forest wardens, who will examine locomotives operating in their respective territories and make report of such inspections to this department. It is believed that this will be an improvement over the former system under which two inspectors covered the entire State, for the reason that in addition to reducing the cost of inspection it will allow inspections to be made over the whole State in the early spring and in the fall, at which seasons it is essential that locomotives be in perfect condition if fires from this source are to be prevented. The inspection of portable sawmills and steam rollers will also be assumed by the district men. The new arrangement of districts is as follows: District No. 1 to include Essex and Middlesex counties, under the supervision of Mr. James E. Moloy, formerly locomotive inspector; District No. 2 to include Norfolk and Bristol counties, under the supervision of Mr. Miner E. Fenn, formerly locomotive inspector: District No. 3 to include Plymouth, Barnstable, Dukes and Nantucket counties, under the supervision of Mr. Joseph J. Shepherd, district forest warden; District No. 4 to include

Worcester and Franklin counties, under the supervision of Mr. John P. Crowe, district forest warden; District No. 5 to include Berkshire, Hampden and Hampshire counties, under the supervision of Mr. Albert R. Ordway, district forest warden.

The law relative to the disposal of slash and brush from wood and lumber cutting operations has been more rigidly enforced this year than in the past, with the result that many miles of slash along railroads and highways have been disposed of. Owing to the large number of woodcutting operations being carried on throughout the State this winter, we shall undoubtedly have more slash and brush left on the ground than in former years. This means an increased fire danger to contend with in many localities.

It is certainly very gratifying to note the large number of towns throughout the State that are using automobile equipment, either wholly or in part, for forest fire work. The tendency is certainly changing rapidly from the horse-drawn to the motor-driven apparatus. We have a large number of towns where the forest fire work is carried on by or in cooperation with the fire department, and in such cases the department combination truck is usually used for running to forest fires. For large or remote fires this is frequently supplemented by the older and slower horse-drawn wagon. The above conditions probably apply more generally to central and eastern Massachusetts than to the western part of the State.

Owing to favorable weather conditions during June, July and August we were able to discontinue fifteen of our stations for several weeks, and to use a number of the observers in the construction work and in painting the observation towers.

A considerable amount of construction work has been completed during the past year. A new tower 50 feet high has been erected on Martha's Vineyard, on land purchased from Capt. B. C. Cromwell adjoining the fish and game reservation in the central part of the island. This tower is equipped with stairs, and allows an unobstructed view of practically the entire island. The towns, together with several residents of the island, contributed very liberally towards the purchase of this tower.

A new 60-foot tower with stairs has been erected on Prospect Hill in Waltham. This station covers several thousand acres of very dangerous fire territory, where we have had some of the most damaging fires during the past four or five years. The cities of Waltham and Newton and the towns of Lexington and Wellesley contributed towards the purchase of this tower.

At Middleborough stairs have been installed in the tower in place of the ladder that has been in use there for some two or three years. The town of Middleborough appropriated \$150 towards the purchase price of the stairs, and the work of construction was assumed by this department.

A new 50-foot tower with stairs has been erected on Little Mugget Hill, Charlton. This station will cover about 150,000 acres of forest lands. The several adjoining towns contributed towards the purchase price of the tower. Iron stairs were installed in our tower at Mendon.

A new 50-foot tower has been purchased for erection on Ragged Mountain in West Brookfield. Cement abutments have been constructed, but owing to insufficient funds it was found necessary to postpone the erection of the tower until another season. This will be done early this coming spring, when the station will be placed in operation.

The tower purchased last spring for Watatic Mountain has been erected during the past season and 2 miles of telephone line has been constructed. This is a 40-foot tower equipped with fire-escape stairs.

The efficiency of our Mount Tom station has been greatly increased by a new arrangement with the Holyoke Street Railway Company, whereby we are given the use of the cupola of the Summit House. Heretofore our observer has used the public observation room which, besides being some 40 feet lower than the cupola, is frequently crowded with visitors, making accurate work on the part of the observer more or less difficult. The new observation room has been equipped with the new regulation map, alidade and telephone.

Several of our towers were painted during the spring and early summer, and a considerable amount of work was done on roads leading to a number of them. A majority of our stations are now easily accessible to automobiles, and the number of visitors is consequently large.

It seems quite necessary that one more station be added to our system if we are to protect the valuable forest area in the towns of Acushnet, Rochester, Fairhaven, Marion and Mattapoisett. The desirable location for this station seems to be Mendall Hill in Acushnet, and if sufficient funds can be raised in the towns which would receive protection from such a station we shall probably erect a tower at this point.

We have recently arranged for the purchase of a site on Robbins Hill, Chelmsford, where we have maintained a small windmill type of tower for the past five years. This tower has proved very unsatisfactory both in design and elevation, and as soon as negotiations for the acquisition of land are completed, and sufficient funds have been contributed by the surrounding towns, we shall proceed with the erection of a large 75-foot tower to replace the one now in use. In spite of the defects mentioned above, this station has proved a valuable one, and with a standard tower giving 40 feet additional elevation it should become one of the best in the State.

Towns receiving Fire-equipment Reimbursement during Year 1917.

					-	
Ashland, .		\$10 00	Lunenburg,			\$89 63
Avon, .		13 42	Russell, .			7 12
Belchertown,		12 85	Savoy, .			26 25
Bellingham,		4 63	Southampton,			33 50
Dunstable, .		54 00	Southwick,			9 00
Georgetown,		53 52	Sunderland,			24 00
Groveland,		62 75	Tolland, .			25 00
Hampden, .		5 49	Whately, .			20.75
Harwich, .		15 00				
Holbrook, .		13 00	Total, .			\$479 91

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT.

Towns.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Acushnet,	1	10	18	-	-	-	4	1	-	-	-	21,8	\$250 00
Ashburnham, .	-		8	-	-	-	-	-	-	-	-	-	25 00
Ashby,	-	-	48	-	-	-	2	2	-	6	-	1	250 00
Ashfield,	-	-	33	-	-	-	-	-	-	-	-	-	99 00
Ashland,	-	24	12	-	-	-	12	8	-	6	24	-	95 78
Auburn,	-	-	83	-	-	-	-	-	-	-	-	-	249 00
Avon,	-	10	-	-	-	-	22	-	5	-	-	-	23 32
Becket,		.14	16	-	-	-	-	2	-	-	24	-	79 50
Bedford,	1	14	24	-	-	-	-	-	-	-	-	12	249 67
Belchertown, .		-	46	12	-	-	-	1	-	12	-	11	224 72
Bellingham,	-	46	27	-	-	-	8	-	-	8	24	11	151 40
Berkley,	-	36	24	-	-	-	-	-	-	-	-		162 00
Berlin,	2	10	38	-	-	1	12	-	3	12	-	11	241 45
Blandford,	6	1	16	-	-	Н	3	3		H	12	-	83 17
Bolton,	-	14	33	-	-	П	6	-	-	6	1-	-	126 65
Boxborough, .	1	12	30	-	-	2	-	-	3	4	3	11	182 80
Boxford,	-	24	16	-		-	-	-	-	-	12	-	51 75
Boylston,	-	-	66	-	-	-	24	-	-	28	-	-	243 61
Brimfield,	-	10	48	-	-	-	-	-		-	-	-	170 25
Brookfield,	-	66	25	-	-	-	-	3	-	24	24	-	127 00
Burlington,	-	-	20	-	-	-	L-	-	-	-	-	-	100 00
Carlisle,	2	15	19	-	2	-	6	-	1	6	12	12	250 00
Charlton,	-	-	77	-	-	-	4	-	-	6	-	-	250 00
Chatham,	2	5	11	-	2	3	4	-	3	5	-	11	152 98
Chester,	-	37	15	-	-	-	-	5	-	-	12	11	156 97
Chesterfield, .	-	-	25	-	-	-	-	-	-	-	-	-	75 00
Colrain,	-	-	10	-	-	-	-	-	-	-	12	-	43 75
Cummington, .	-	-	19	-	-	-	-	-	-	-	-	-	102 12
Dana,	-	-	6	-	-	-	-	-	-	-	-	13	250 00
Dighton,	5	8	26	-	1	-	-	-	5	2	30	21	242 89
Douglas,	-	75	50	-	-	-	-	-	-	-	-	-	180 25
Dunstable,	2	25	22	-	1	-	4	-	3	6	16	11	164 69
East Longmeadow,	2	-	18	-	2	-	12	3	-	4	-	11	164 46
Edgartown,	2	5	10	-	2	3	4	-	3	5	-	11	152 17
Enfield,	-	20	27	-	-	-	-	-	-	-	-	-	85 87
	1	1	1	1		1	1	<u> </u>	1	-	-		

¹ One-horse.

² Two-horse.

³ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Continued.

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Towns.		Ахев.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Erving, .		-	-	27	6	-	-	-	1-	-	18	_	-	\$94 52
Essex,		-	24	12	-	-	-	-	-	-	-	-	-	37 80
Florida, .		-	-	8	-	1	-	5	1	·-	-	-	-	31 25
Freetown, .			24	20	-	-	-	-	2	Н	72	-	-	167 48
Georgetown,			54	66	-	-	-	-	-	6	24		-	250 00
Gill,		-	5	20	-	-	-	-	-	-	-	-	٠-	65 00
Goshen, .		Е	12	58		-	-	-	-	-	-	-	-	244 05
Gosnold, .		-	8	12	-	-	-	-	-	-	-	-	-	55 40
Granby, .		-	12	12	-	-	-	-	-	-	-	-	-	39 90
Granville, .		-	10	22	-	-	-	-	-	-	-	-	21	203 50
Greenwich, .		-	-	18	1-	-	-	-	-	-	-		-	60 45
Groveland, .		-	18	22	-	-	-	-	-	5	24	12	-	113 80
Hadley, .			-	15	-	-	-	-	-	-	-	-	-	75 00
Halifax, .			12	64		-	-	12	-	1-1	18		11	241 91
Hampden, .		-	-	24	1	-	-	24	-	6	6	18	-	94 55
Hancock, .		-	9	-	-	-	-	-	2	-	-	6	-	14 37
Hanson, .		-	6	24	1-	-	-	6	-	-	5	-	21,3	250 00
Harvard, .		2	7	29	-	2	3	-	-	3	12	-	12	250 00
Harwich, .		-	-	14	1-1	-	-	-	2	-	-	-	2	79 50
Holbrook, .		-	12	31	-	-	-	-	7	-	-	48	-	203 25
Holland, .		-	-	8	-	-	-	-	-	-	-	-		25 00
Hubbardston,		-	-	52	-	-	-	18	-	-	4	-	-	175 75
Kingston, .		Ŀ	-	24	-	-	-	-	-	-	-	-	21	108 00
Lakeville, .		-	20	17	-	-	-	-	_	-	-	-	-	80 00
Lanesborough,		2	5	8	-	3	-	-	3	6	6	48	11	131 50
Leverett, .		2	20	16	8	2	4	-	2	4	8	-	21	160 17
Leyden, .		16	10	10	17	-	-	-	-	4	8	-	-	31 55
Littleton, .		-	-	6	-	-	-	-	-	-	18	-	-	34 87
Lunenburg, .		2	36	30	-	2	3	4	-	3	29	-	11	250 00
Lynnfield, .		-	35	20	-	_	-	-	10		-	6	21	249 95
Mashpee, .		6	24	25	-	-	-	12	1-	-	12	-	11	157 12
Mendon, .		-	24	21	-	-	-	-	-	-	-	42	11	173 97
Merrimac, .		-	-	15	-	-	-	-	-	-	-	-	-	75 00
Middleton, .		-	12	16	6	2	-	-	-	-	5	-	-	157 69
	- 1	1		1	1	1	- 1				-			

¹ One-horse.

² Two-horse.

⁸ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT Act — Continued.

Towns. Section Sectio	
Monterey,	Towns.
Montgomery, . - <td< td=""><td>Millis,</td></td<>	Millis,
New Ashford, - - - - - - - 4 - 4 - 4 - 18 New Braintree, - - - - - - - - - 6 - 122 New Salem, - - 55 20 - -	Monterey,
New Braintree, -	Montgomery, .
New Salem,	New Ashford, .
Newbury, . - - 6 - - - 8 - - 12 - 55 Norfolk, . - - 18 - - - - - - 99 North Reading, - - 38 - - - - - - 12 11 250 Northborough, - - 25 - - - - - - - 102 Norton, - - 2 8 - - - - - - 102 Norton, - - 2 8 - - - - - 12 12 12 12 12 12 14 241 Norwell, - 6 - 82 - - - 12 - 11 250 Oakham, - - 12 31 - 1 1 6 - 3 3 - </td <td>New Braintree, .</td>	New Braintree, .
Norfolk, 18 99 North Reading, 38 12 11 250 Northborough, 25 12 12 1 241 Norton, 2 8 12 - 12 12 1 241 Norwell, . 6 - 32 12 - 12 - 11 250 Cakham, 12 31 - 1 1 6 - 3 3 - 11 226 Otis, 5 10 1 1 66 Paxton, . 3 - 28 12 1 1 66 Pathon, 19 5 84 Pembroke, 31 60 12 250 Petersham, . 2 10 36 - 2 3 4 - 3 5 - 11 248 Phillipston, 36 38 1 1 130 Plainfield, 30 1 146 Plainville, . 2 10 22 - 2 3 4 - 3 5 30 11 228	New Salem,
North Reading, 38 12 11 250 Northborough, 25 12 12 1 241 Norton, 2 8 12 - 12 12 1 241 Norwell, . 6 - 32 12 - 12 - 11 250 Oakham, 12 31 - 1 1 6 - 3 3 - 11 226 Otis, 5 10 1 66 Paxton, . 3 - 28 12 1 66 Pathon, . 3 - 28 12 1 84 Pembroke, 31 60 12 250 Petersham, . 2 10 36 - 2 3 4 - 3 5 - 11 248 Phillipston, 36 38 1 130 Plainfield, 30 1 146 Plainville, . 2 10 22 - 2 3 4 - 3 5 30 11 228	Newbury,
Northborough, 25 102 Norton, 2 8 12 12 1 241 Norwell, . 6 - 82 12 - 12 - 11 250 Oakham, 12 31 - 1 1 6 - 3 3 - 11 226 Otis, 5 10 1 66 Paxton, . 3 - 28 12 1 66 Patham, 19 5 84 Pembroke, 31 60 12 250 Petersham, . 2 10 36 - 2 3 4 - 3 5 - 11 248 Phillipston, 36 38 1 130 Plainfield, 30 1 146 Plainville, . 2 10 22 - 2 3 4 - 3 5 30 11 228	Norfolk,
Norton, 2 8 12 12 12 1 241 Norwell, 6 - 82 12 - 12 - 14 250 Oakham, 12 31 - 1 1 6 - 3 3 - 11 226 Otis, 5 10 1 1 66 Paxton, . 3 - 28 12 5 6 - 105 Pelham, 19 5 84 Pembroke, 31 60 12 250 Petersham, . 2 10 36 - 2 3 4 - 3 5 - 11 248 Phillipston, 36 38 1 130 Plainfield, 30 1 146 Plainville, . 2 10 22 - 2 3 4 - 3 5 30 11 228	North Reading, .
Norwell, 6 - 82 12 - 12 - 11 250 Oakham, 12 31 - 1 1 6 - 3 3 - 11 226 Otis, 5 10 1 66 Paxton, . 3 - 28 12 66 105 Pelham, 19 5 84 Pembroke, 31 60 12 250 Petersham, . 2 10 36 - 2 3 4 - 3 5 - 11 248 Phillipston, 36 38 1 130 Plainfield, 30 1 146 Plainville, . 2 10 22 - 2 3 4 - 3 5 30 11 228	Northborough, .
Oakham, . - 12 31 - 1 1 6 - 3 3 - 11 226 Otis, . . - 5 10 - - - 1 - - - 66 Paxton, . 3 - 28 12 - - - 6 - - 105 Pelham, . - - 19 - - - - 5 - - - 84 Pembroke, . - - 31 - - - 60 - - - - 12 250 Petersham, . 2 10 36 - 2 3 4 - 3 5 - 11 248 Phillipston, . - 36 38 - - - - - - - 130 Plainfield, . - - 30 - -	Norton,
Otis, 5 10 1 66 Paxton, 3 - 28 12 6 105 Pelham, 19 5 84 Pembroke, 31 60 1 ² 250 Petersham, 2 10 36 - 2 3 4 - 3 5 - 1 ¹ 248 Phillipston, 36 38 1 130 Plainfield, 30 1 146 Plainville, 2 10 22 - 2 3 4 - 3 5 30 1 ¹ 228	Norwell,
Paxton, 3 - 28 12 6 105 Pelham, 19 5 84 Pembroke, 31 60 1 ² 250 Petersham, 2 10 36 - 2 3 4 - 3 5 - 1 ¹ 248 Phillipston, 36 38 1 130 Plainfield, 30 1 146 Plainville, 2 10 22 - 2 3 4 - 3 5 30 1 ¹ 228	Oakham,
Pelham,	Otis,
Pembroke, 31 60 1 ² 250 Petersham, 2 10 36 - 2 3 4 - 3 5 - 1 ¹ 248 Phillipston, 36 38 1 130 Plainfield, 30 146 Plainville, 2 10 22 - 2 3 4 - 3 5 30 1 ¹ 228	Paxton,
Petersham,	Pelham,
Phillipston, 36 38 1 130 Plainfield, 30 146 Plainville, 2 10 22 - 2 3 4 - 3 5 30 11 228	Pembroke,
Plainfield, 30 146 Plainville, 2 10 22 - 2 3 4 - 3 5 30 1 228	Petersham,
Plainville, 2 10 22 - 2 3 4 - 3 5 30 11 228	Phillipston,
	Plainfield,
Plympton 12 - 18 25	Plainville,
Tiyinpoon,	Plympton,
Prescott, 100 10 58	Prescott,
Princeton, 32 80 249	Princeton,
Raynham, 3 46 30 - 6 3 12 - 9 15 - 31 222	Raynham,
Rehoboth, 10 48 11 250	Rehoboth,
Richmond, 15 31 4 12 109	Richmond,
Rochester, 24 60 30 205	Rochester,
Royalston, 3 20 32 30 2 2 12 42 - 21 250	Royalston,
Russell, 10 30 1 - 4 12 11 227	Russell,
Rutland, 12 18 6 13 250	Rutland,
Salisbury, 6 - 47 - 10 - 29 11 250	Salisbury,
Sandwich, 22 12 36 2 24 - 11 245	Sandwich,
Savoy, 5 26	Savoy,

¹ One-horse.

² Two-horse.

⁸ Motor truck.

INVENTORY OF EQUIPMENT PURCHASED UNDER THE REIMBURSEMENT ACT — Concluded.

				ACT		ona	ruae						
Towns.	Axes.	Cans.	Extinguishers.	Hoes.	Lanterns.	Mattocks.	Pails.	Pumps.	Rakes.	Shovels.	Wire Brooms.	Wagons.	Reimburse- ment.
Shelburne,	1 -	-	50	-	-	-	-	5	12	6	-	1	\$186 87
Shirley,	-	48	42	-	-	-	-	-	-	-	-	-	166 50
Shutesbury,	-	28	25	-	-	-	23	-	-	16	_	-	101 25
Southampton, .	-	10	-	-	-	-	-	5	-	-	12	-	42 25
Southwick,	-	13	26	12	-	-	3	2	-	24	-	11	131 07
Sterling,	-	-	25	-	-	-	_	-	-	-	18	12	241 12
Stow,	-	-	42	-	-	-	-	-	-	18	1-	-	131 31
Southbridge, .	-	11	35	-	-	-	-	-	-	-	-	-	116 45
Sudbury,	-	-	40	-	-	-	-	-	-	-	-	-	250 00
Sunderland,	-	-	-	-	-	-	-	-	-	-	-	4	24 00
Sutton,		50	50	24	-	-	-	-	32	24	-	1	188 46
Tewksbury,	2	-	24	-	2	-	-	-	-	30	-	11	174 00
Tolland,	2	-	-	12	6	-	12	6	-	-	4	-	43 26
Townsend,	-	-	46	-	-	-	-	-	-	_	-	-	250 00
Tyngsborough, .	-	220	20	-	-	-	-	54	12	24	36	-	250 00
Tyringham,	2	10	30	-	2	-	10	-	2	3	-	12	144 80
Upton,	1	18	30	-	-	-	-	-	-	-	24	11	240 23
Wales,	2	-	40	12	2	2	2	-	-	6	-	11	241 99
Warwick,	-	6	10	-	-	-	-	-	-	-	-	11	154 35
Washington,	-	-	15	3	1	-	10	-	-	18	-	11	105 32
Wendell,	-	38	27	-	2	L-	12	-	-	18	-	11	163 24
West Boylston, .	-	-	107	-	-	-	-	-	-	-	-	-	250 00
West Bridgewater,	-	-	20	-	-	-	-	-	-	_	-	11	250 00
West Brookfield, .	-	16	49	-	-	-	-	7	-	12	24	-	221 50
West Newbury, .	-	8	13	-	-	-	-	3	-	-	18	-	87 12
Westhampton, .	-	-	16	-	-	-	-	-	-	-	-	-	48 00
Westminster, .	-	77	48	24	-	-	24	1	-	36	12	-	250 00
Whately,	-	-	-	-	-	-	-	4	-	-	12	-	20 75
Wilbraham,	-	27	32	-	-	-	23	4	12	6	12	-	118 38
Wilmington,	-	12	40	-	1	-	-	18		34	-	-	187 38
Windsor,	-	-	60	-	-	-	-	-	-	-	-	-	250 00
Worthington, .	2	15	10	-	-	3	-	-	I-	5	-	11	86 01
Wrentham,	-	12	30	-	-	4	-	-	-	-	-	11	250 00
Totals,	114	1,910	3,602	179	61	42	474	210	151	868	647	70	\$20,575 32
				- 1		1							

¹ One-horse.

² Two-horse.

Forest Fires of 1917.

	Mon	rus.			Number.	Acres.	Cost to extinguish.	Damage.
	191	6.						
December,				٠	16	200	\$102	\$10
	191	7.						
January,					53	243	300	35
February,			• *		14	35	-	47
March,					126	379	420	85
April, .					824	7,516	5,819	12,639
Мау, .					518	7,283	6,068	16,088
June, .				٠	56	406	469	630
July, .					46	119	171	2,145
August,					65	294	1,308	3,675
September,					23	29	223	65
October,					20	39	237	50
November,					414	3,477	2,916	5,640
Totals,				• -	2,175	20,020	\$18,033	\$41,109

CLASSIFIED CAUSES OF FOREST FIRES FOR THE PAST FIVE YEARS.

		1912.	2.	1913.	63	119	1914.	1915.	15.	19	1916.	19	1917.
(A OBER.	ź	umber.	Number. Per Cent.	Number.	Number. Per Cent.								
Unknown,		649	35.1	650	24.2	1,174	37.0	1,134	37.7	301	30.8	634	29.2
Railroad,		640	34.6	913	34.0	830	36.0	777	25.8	412	42.1	800	36.8
Burning brush,		83	5.0	148	5.5	196	6.2	439	14.5	79	8.1	262	12.0
Hunters (smokers), .	•	223	12.0	386	14.3	520	16.4	129	4.2	111	11.3	224	10.3
Steam sawmills,		00	4.	9	63.	က	1.	10	1.	2	2.	ro.	5.
Children,	-	62	4.3	109	4.1	140	4.4	191	5.3	35	3.6	133	6.1
Miscellaneous,		159	8.6	476	17.7	318	6.6	363	12.4	38	3.9	117	5.4
Totals,	•	1,851	100.0	2,688	100.0	3,181	100.0	3,008	100.0	826	100.0	2,175	100.0

Types of Land burned over (Acres).

							1914.	1915.	1916.	1917.
Timber, .							3,001	3,817	1,435	1,237
Second growth							9,016	6,749	755	2,274
Second growth	, not	mer	chan	table	, .		7,943	9,107	1,970	4,137
Brush land,							11,645	14,681	9,990	7,126
Grass land,							3,510	8,129	1,573	3,814
Not classified,							4,860	5,907	475	1,432
Totals,						.]	38,975	48,389	16,198	20,020

Types of Classified Damages.

				1914.	1915.	1916.	1917.
Standing trees,		٠.		\$50,697	\$73,782	\$18,786	\$24,705
Logs, lumber, cordwood,		•		4,427	23,544	4,545	4,680
Buildings, bogs, etc.,			.]	3,530	31,904	10,823	6,893
Bridges, fences, .		٠.		331	1,930	1,638	687
Not classified,				26,404	9,907	8,973	4,144
Totals,				\$95,389	\$141,073	\$14,765	\$41,109

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST EIGHT YEARS.

	YE.	AR.		Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910, .				1,385	42,221	\$23,475	\$205,383	30.46	\$148 29
1911, .				2,356	99,693	47,093	537,749	39.31	226 24
1912, .				1,851	22,072	20,219	80,834	11.92	43 67
1913, .				2,688	53,826	35,456	178,357	20.02	66 35
1914, .				3,181	38,975	48,750	95,389	12.25	29 98
1915, .				3,008	48,389	36,783	141,073	16.08	46 90
1916, .				1,225	16,198	8,593	44,765	13.22	36 54
1917, .				2,175	20,020	18,033	41,109	9.21	18 90

FIRES REPORTED FROM OBSERVATION STATIONS.

[The asterisk (*) signifies station not in operation.]

No.	STATIONS.	1914.	1915.	1916.	1917.
1	Harwich station,	. 35	31	20	22
2	Barnstable station,	. 14	42	7	10
3	Falmouth station,	. 1	13	9	7
4	Bourne station,	. 54	114	28	18
5	Kingston station,	. 116	102	25	36
6	Waltham station,			•	2
7	Middleborough station,	. 133	128	61	25
8	Fall River station,	. 33	453	222	151
9	Rehoboth station,	. 105	101	148	79
10	Hanson station,	. 68	167	68	39
11	Hingham station,	. *	*	•	24
12	Sharon station,	. 203	280	42	72
13	Sudbury station,		98	97	77
14	Wakefield station,	174	263	40	35
15	Chelmsford station,	302	276	29	71
16	Georgetown station,	. *	213	26	30
17	Manchester station,	. 96	272	3	4
18	Mendon station,		•	65	63
19	Westborough station,	386	530	74	74
20	Wachusett station,	485	598	121	184
21	Petersham station,		*	•	
22	Watatic station,		*	•	
23	Warwick station,	94	36	38	37
24	Pelham station,	47	59	15	24
25	Brimfield station,	90	86	30	41
26	Charlton station,			•	*
27	Mount Tom station,	135	72	•	37
28	Shelburne Falls station,	130	104	38	34
29	Savoy station,	11	13	1	5
30	West Brookfield station,	•	•	•	*
31	Chester station,	• 1		2	1
32	Tolland station,	•	•	13	14
33	Mount Everett station,	•	3	32	22
34	Lenox station,	•	•	11	21
35	Williamstown station,	•	56	8	-
36	Martha's Vineyard station,	•	•	•	-

PRECIPITATION IN INCHES FROM 1911 TO 1917, INCLUSIVE.

		1911.	1912.	1913.	1914.	1915.	1916.	1917.	Normal
December,		3.24	2.59	5.73	3.66	4.56	5.69	3.71	3.74
January,		3.07	3.87	3.21	4.30	7.38	1.84	3.32	4.12
February,		3.20	2.24	3.77	3.52	4.30	5.37	3.15	3.97
March, .		3.27	5.26	5.32	4.20	.06	4.16	5.03	4.34
April, .		2.86	4.05	4.73 .	5.51	2.44	5.43	3.18	3.46
May, .		.89	4.03	2.85	2.95	2.01	3.97	5.86	3.37
June, .		4.76	.53	3.20	1.75	1.43	5.31	4.77	3.07
July, .		4.55	4.16	2.00	3.38	9.52	7.55	.85	3.65
August, .		€.70	3.85	3.30	4.59	4.83	2.81	8.58	3.70
September,		3.36	1.71	2.77	.45	.74	1.66	3.17	4.36
October,		3.01	1.52	7.62	2.03	3.11	1.81	6.88	4.13
November,		5.71	3.45	2.70	3.06	2.47	1.88	.63	3.96
Totals,		44.62	37.26	47.20	39.40	42.85	47.48	49.13	45.87

APPROPRIATION FOR PREVENTION OF FOREST FIRES.

Appropriation f	or 19	17,							\$28,000	00
Receipts: —										
For equipment	from	towns	and	cities,					1,899	41
For fire towers:	_									
Auburn, .									100	00
Bridgewater,									100	00
Charlton,									100	00
Douglas,							• •	·	100	00
Dudley, .									100	00
Edgartown,									200	00
Groton, .									100	00
Lexington,									200	00
Middleboroug									150	00
Millbury,									100	00
Newton,									200	00
Oxford, .									100	00
Scituate,						•,			150	00
Southbridge,									100	00
Spencer, .									100	00
Sturbridge,									100	00
Sutton, .									100	00
Tisbury,									200	00
Uxbridge,									75	00
Waltham,									300	00
Wellesley,									200	00
M1. and Mrs.	. Edr	nund l	Bridg	е					25	00
Mr. William									25	00
Mr. Francis									25	00
Seven Gates								• .	25	00

62 THE	STATE	FORE	STER		[Ja	in.
Adams Express Company, .					. \$6	00
Boston & Albany Railroad, .					. 14	92
Boston & Maine Railroad, .				•	. 22	32
New York, New Haven & Ha	rtford Railr	oad,			. 6	74
Paul D. Kneeland,					. 52	00
New England Telephone and					. 4	61
Mill units to England,					. 381	59
New Hampshire,					. 80	00
Rhode Island,					. 8	00
Rebate on salary increase, .					. 227	52
					\$33,678	11
Expenditures: —		•				
Pay roll,					. \$16,267	72
Traveling expenses,				•	. 4,895	75
Printing, Stationery and postage,		•			. 793	02
Stationery and postage, .					. 132	87
Sundries,					. 94	76
Equipment,					. 1,704	60
Construction,					. 5,597	59
Teams, freight and express, .	. :				. 225	94
Telephone,					. 737	83
~					. 5	80
Town supplies, '					. 2,770	05
m 1					. 321	22
Rent,		1. Table 1			. 130	00
					\$33,677	15
Balance returned to treas	sury, .					96
					\$33,678	11

RAILROAD FIRES.

\$479 91

Reimbursement for forest fire-fighting equipment to towns,

Our reports on file show that we have had 800 railroad fires, as follows: Boston & Albany, 227; Boston & Maine, 129; New York, New Haven & Hartford, 398; and Central Vermont, 46. These fires burned over an area of 7,950 acres, with a damage of \$13,185 and cost to extinguish of \$5,800.

The number of railroad fires has increased considerably over last year. The railroad officials claim that this is due in a measure to defective coal that they have been obliged to use this season. This is undoubtedly true in many instances, but just what percentage of these fires was due to this cause I am unable to state. Our inspectors' reports of locomotives examined by them show many minor defects, but very few serious defects on locomotives that were used entirely within the State.

Owing to the shortage of labor and the high wages paid in practically all industries throughout the State, many towns have experienced considerable difficulty in securing men for fighting forest fires. This is especially true in the case of railroad fires, as the railroads are at present paying only 25 cents per hour for this work. It seems very evident that



This photograph was taken in the 80-acre plantation on Nantucket. It represents a growth of 29 inches the past season. These trees were four-year-old white pine transplants when set, and the whole plantation thus far is a pronounced success. The average growth of the plantation this season is over 8 inches. Two-year-old Scotch pine seedlings set at the same time have not done as well. This experiment is in co-operation with the Nantucket Civic League.



This photograph was taken in September, and shows dry dead grass standing along a trolley line. Is there any wonder that forest fires develop here? Never-go-out matches, cigarette and cigar stubs are constantly being thrown from electric cars. Here are ideal conditions



this rate must be increased to at least 35 or 40 cents per hour for laborers, and 50 cents per hour for wardens, if we are to secure the labor necessary for handling this class of fires in the future.

During the past years we have had considerable trouble with the Central Vermont locomotives, owing to the terminals being in Vermont and Connecticut, but this season the Massachusetts Public Service Commission has required that a report be filed with them each month showing the actual condition of the front ends and ash pans of the locomotives running through this State. Our inspectors have inspected 1,249 locomotives, as follows: Boston & Albany, 167, of which 63 were defective; Boston & Maine, 346, of which 34 were defective; New York, New Haven & Hartford, 736, of which 211 were defective.

The following reports from Mr. E. A. Ryder, commissioner of the Boston & Maine Railroad, and Mr. Charles B. Rood, general fire claim agent of the New York, New Haven & Hartford Railroad, will give you a general idea of what these roads have done during the past year relative to fire protection.

Boston, Mass., Dec. 14, 1917.

Mr. M. C. Hutchins, State Fire Warden, State House, Boston, Mass.

DEAR SIR: — Acknowledging your letter of the 5th instant, relative to report covering fire prevention work for the current year, we beg to state that during the eleven months we have had 940 fires from sparks from locomotives.

During November we had 272 fires, which is the greatest number we have had in that month since taking hold of this work in 1912.

Practically all of this year our section crews have been lacking the usual number of men, so that it has been difficult to attempt more than the necessary track work; and in some cases we could not even man our patrol cars. This of course delayed and in many cases prevented the cutting of the grass and burning the right of way. It should also be borne in mind that in many places the hay crop was not harvested, so that the rain during the first three weeks of October so matted the grass that it left "comfy" places for sparks; and to make matters worse, we had neither rain nor snow the first twenty days of the month, but did have almost daily high winds, — a very unusual condition.

For the eleven months we have paid, in fire claims, \$20,045.40, and for outside help in fighting fires, \$1,652.03, compared with \$35,884.51 and \$4,335.64, respectively, for 1916.

During the period we have received forty-two permissions to burn grass and slash on property contiguous to our right of way, and we have written many individuals and firms requesting that they remove fire hazards.

Six hundred and twenty-one locomotives reported as setting fires have received special examination.

Yours truly,

E. A. RYDER, Commissioner.

BOSTON, MASS., Dec. 21, 1917.

Mr. M. C. Hutchins, State Fire Warden, State House, Boston, Mass.

DEAR SIR: — Complying with your request of Dec. 5, 1917, relative to the activities of this department in cleaning up right of way, etc., beg to advise that during the past year, commencing Jan. 1, 1917, we have cleared up approximately 500 miles of right of way and adjacent property, cutting the underbrush and

trimming trees for fire protection, at a total cost of \$6,132.49. Practically the entire length of right of way in the State of Massachusetts has been burned over, with the exception of certain places where it has been too damp to burn up to the present time. This is also true of many parcels adjoining our right of way where permits to burn could be obtained, and where it was not necessary to cut any brush or undergrowth.

Since Jan. 1, 1917, up to and including this date, we have received 121 claims from property owners in the State of Massachusetts, of which 84 claims have been settled for a total of \$9,775.59, leaving a balance of 37 unsettled claims, all of which, however, are for slight damages.

We have paid \$338.77 to various towns in the State of Massachusetts for services in extinguishing fires during the above period, of which amount \$182.11 was paid to towns on the Cape.

Regarding the matter of patrol work, would say that it has long been our custom, during the dry seasons each year, to place patrolmen on practically every dangerous section of the line, whose duty it is to follow up all trains as closely as possible and watch for fires.

Yours very truly, C. B. Rood, General Fire Claim Agent.

FEDERAL CO-OPERATION.

We have maintained the same co-operative arrangement with the United States Forest Service this year as in former years, the allotment allowed the Commonwealth of Massachusetts being \$2,752 for payment of observers, and \$500 for construction work. As the regulations governing the Federal allotment required that the observers and men on construction work be paid direct by the Federal department, it was necessary to transfer nine observers to the Federal pay roll for the entire season, and five men for a period covering the time the construction appropriation lasted. The aid received from the Federal department has certainly been of great assistance to this department, allowing us to expend a portion of our State appropriation for the construction of observation towers. Our allotment for the coming season will undoubtedly remain the same, with the exception of the construction appropriation.

During the season Mr. Louis S. Murphy, acting chief of State Cooperation of the Federal Forest Service, visited several of the Massachusetts stations maintained by that department.

Of the \$2,000 appropriated by the General Court for reimbursing towns with a valuation of \$1,750,000 or less, 50 per cent. on forest fire-fighting equipment purchased by them and approved by this department, but \$479.91 has been expended. This is the lowest expenditure from this appropriation in several years, and is probably due to the favorable fire season and also to the fact that many of the reimbursement towns have already taken up their entire allotment.

Respectfully submitted,
M. C. HUTCHINS,
State Fire Warden.

STATE HIGHWAY WORK.

Along the State highways spraying and cleaning for the gypsy and brown-tail moths and the elm-leaf beetle were done under the direction of this department. A list of the towns and cities in which the work was done may be found in the report of the State Highway Commission. The expenditure amounted to \$10,000.

Co-operative Moth Work.

Co-operative moth work has been carried on this past year as heretofore on the North Shore. Spraying was done in Dover last year, but very little other co-operative work has been done. The financial condition of the funds is as follows:—

Special North Shore Fund.

Balance Nov. 30, 1916,	1 46
Receipts: —	
Wm. D. Sohier, agent for property owners, . 2,456	6 64
F. W. Rane, State Forester, 6,000	0 00
Wm. D. Sohier, agent, 6,000	0 00
City of Beverly,	0 00
Town of Manchester, 3,000	0 00
Massachusetts Highway Commission, 631	1 70
Massachusetts Highway Commission (mosquito	
work),	6 71
	0 00
Sale of water carts,	0 00
Sale of empty barrels,	6 10
Appropriation for suppression of gypsy and	
brown-tail moths,	
Wm. D. Sohier, for property owners, 1,961	
Wm. D. Sohier, agent,	0 00
F. W. Rane, State Forester, 1,000	0 00
	\$30,995 73
Expenditures: —	
Pay roll,	
Travel,	
Supplies,	
Sundries,	22 35
Rent of store,	5 00
	29,460 36
Balance, Nov. 30, 1917,	. \$1,535 37

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			sy IVI	otn r	rund.	0.4574	0.5		
Balance, Nov. 30, 1916,	٠	٠	•	• -	٠	\$471	35		
Receipts: —						22.4	00		
For wood sold,	•	•	•	•	•	334			
For spraying,	•	•	•	, • • ·	•	1,383	40	\$2,189	60
Expenditures: —								Φ2,109	00
Pay roll,						\$96	59		
Supplies,				•	•	1,971			
Sundries,	•	•	•	Ċ			00		
cultures,	•		•					2,081	04
•									
Balance, Nov. 30, 191	7.							\$108	64
,	,								
Saga	more	e Gy	psy 1	Moth	Fund	d.			
Balance, Nov. 30, 1916,						\$329	73		
Receipts: —									
Spraying (1916),						243	85		
Balance, Nov. 30, 191	7,			• •		\$573	58		
Fin	IAN(CTAT	STA	TEN	IENT				

A			Sala					#C 000	00
Appropriation for 1917,	•	•	٠	•	• 1	• •		\$6,900	
Expenditures,	•	•	٠		•		1 •	6,291	90
Balance returned to tr	00 511	rer N	lovr '	20 1:	017			\$608	50
Dalance returned to tr	easu	цут	107.	oo, 1	911,	• •	•	ф 0 00	30
	Off	ice I	ncide	ntals					
Appropriation for 1917,						. :		\$5,100	00
Expenditures: —	·		·	·	Ť	•		**-,	
Travel,						\$1,506	98		
Printing,				٠.		826			
Stationery and postage,						1,390	37		
Supplies,						100	70		
Maps, photos, etc., .						290	88		
Educational work, .						58	74		
		•	•			58 400			
Educational work, .		•	•		•			4,574	17
Educational work, Sundries,			•		•	400	10		
Educational work, .		ry N	ov. a	30, 19	917,	400	10		

THE DISTRIBUTION OF SUPPLIES.

The following is a list of cities and towns, with amount of supplies for moth work furnished them, for the year ending Nov. 30, 1917. The amounts given are the gross amounts furnished, some of the cities and towns having made payments to the State Forester's office for all or a part of the amounts, according to their net expenditures or their class under the provisions of the law. For amounts received from this office in reimbursement and supplies see the table on page 73.

List of Cities and Towns and Amounts of Supplies furnished for 1917.

Acton, \$861 35 Eastham, \$3 73 Andover, 1,586 70 Easthampton, 40 75 Arlington, 632 50 Essex, 254 44 Ashburnham, 362 76 Foxborough, 163 00 Ashby, 426 94 Franklin, 81 50 Ashland, 508 19 Gardner, 97 80 Attleboro, 97 80 Georgetown, 648 54 Auburn, 84 90 Gloucester, 446 62 Avon, 124 45 Grafton, 4 23 Ayer, 340 27 Groton, 913 68 Barnstable, 6 32 Groveland, 1,082 96¹ Bedford, 1,139 23 Halifax, 250 10 Berkley, 489 31 Hamilton, 986 96 Berlin, 489 37 Hanson, 304 96 Billerica, 1,398 26 Harvard, 1,054 19 Bokborough, 692 97 Hingham, 1,422 00 Boxborough, 692 97 Hingham, 1,422 00 </th <th></th> <th></th> <th>_</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>			_									
Andover, 1,586 70 Easthampton, 40 75 Arlington, 632 50 Essex, 254 44 Ashburnham, 362 76 Foxborough, 163 00 Ashby, 426 94 Franklin, 81 50 Ashland, 508 19 Gardner, 97 80 Attleboro, 97 80 Georgetown, 648 54 Auburn, 84 90 Gloucester, 446 62 Avon, 124 45 Grafton, 91 368 Barnstable, 6 32 Groveland, 1,082 961 Bedford, 1,139 23 Halifax, 250 10 Berkley, 488 93 Hamilton, 986 96 Berlin, 489 37 Hanover, 918 74 Beverly, 545 55 Hanson, 304 06 Billerica, 1,398 26 Harvard, 1,054 19 Botton, 753 97 Harwich, 254 13 Boxborough, 692 97 Hingham, 1,422 00 Boxford, 731 06 Holbrook, 265 29 Boylston, 66 17 Holden, 195 46 Burlington, 614 99 Hudson, 562 80 Cambridge, 308 10 Ipswich, 1134 02 Canton, 2,295 95 Kingston, 12 36 Carlisle, 586 26 Lakeville, 199 95 Carlisle, 586 26 Lakeville, 199 95 Carlord, 1,384 67 Lexington, 1,033 00 Danvers, 1,036 14 Lowell, 845 26 Concord, 692 98 Littleton, 1,033 00 Danvers, 1,036 14 Lowell, 845 26 Duxbury, 1,182 72 Malden, 899 74 1					@CC1	0.5	TO41				60	70
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Burlington, 614 99 Hudson, 562 80 Cambridge, 308 10 Ipswich, 1,134 02 Canton, 2,295 95 Kingston, 12 36 Carlisle, 586 26 Lakeville, 199 95 Carver, 275 27 Lancaster, 203 75 Chelmsford, 1,384 67 Lexington, 1,805 03 Cohasset, 2,125 60 Lincoln, 2,591 891 Concord, 692 98 Littleton, 1,033 00 Danvers, 1,036 14 Lowell, 845 26 Dracut, 1,251 11 Lunenburg, 1,056 11 Dunstable, 508 80 Lynnfield, 1,013 35 Duxbury, 1,182 72 Malden, 809 741	Brewster,	4.	٠.			78	Holliston,				156	35
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Cambridge, 308 10 Ipswich, 1,134 02 Canton, 2,295 95 Kingston, 12 36 Carlisle, 586 26 Lakeville, 199 95 Carver, 275 27 Lancaster, 203 75 Chelmsford, 1,384 67 Lexington, 1,805 03 Cohasset, 2,125 60 Lincoln, 2,591 891 Concord, 692 98 Littleton, 1,033 00 Danvers, 1,036 14 Lowell, 845 26 Dracut, 1,251 11 Lunenburg, 1,056 11 Dunstable, 508 80 Lynnfield, 1,013 35 Duxbury, 1,182 72 Malden, 809 741	Burlington,				614	99	Hudson, .				562	80
Canton,					308	10	Ipswich, .				1,134	02
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Carver, 275 27 Lancaster, 203 75 Chelmsford, 1,384 67 Lexington, 1,805 03 Cohasset, 2,125 60 Lincoln, 2,591 89 1 Concord, 692 98 Littleton, 1,033 00 Danvers, 1,036 14 Lowell, 845 26 Dracut, 1,251 11 Lunenburg, 1,056 11 Dunstable, 508 80 Lynnfield, 1,013 35 Duxbury, 1,182 72 Malden, 809 74 1					586	26	Lakeville,				199	95
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Danvers, . 1,036 14 Lowell, . 845 26 Dracut, . 1,251 11 Lunenburg, . 1,056 11 Dunstable, . 508 80 Lynnfield, . 1,013 35 Duxbury, . 1,182 72 Malden, . 809 74 1				•							1,033	00
Dracut, . . 1,251 11 Lunenburg, . . 1,056 11 Dunstable, . . . 508 80 Lynnfield, 1,013 35 Duxbury, . . 1,182 72 Malden, . . 809 74 1		•	· ·	•							845	26
Dunstable, . . 508 80 Lynnfield, . . 1,013 35 Duxbury, . . 1,182 72 Malden, . . 809 74 1											1,056	11
Duxbury, 1,182 72 Malden, 809 74 1					,						1,013	35
000 84							1				809	741
Last Diagonatol,		tor	•								359	51
	Last Dilugewa	aucı,		•	1	30						

¹ This amount includes cost of sprayer.

List of Cities and Towns and Amounts of Supplies furnished for 1917-Concluded.

Mansfield,	. \$11 14	Saugus,	. \$810 27
Marblehead,	. 158 50	Scituate,	. 1,352 95
Marlborough,	. 1,105 47	Sharon,	. 1,740 691
Marshfield,	. 1,260 73	Sherborn,	. 889 36
Mashpee,	. 537 21	Shirley,	. 562 80
Medfield,	. 666 85	Shrewsbury,	. 293 30
Medford,	. 79 25	Southborough, .	. 548 56
Medway,	. 122 25	Sterling, ,	. 362 49
Merrimac,	. 1,083 831	Stoneham,	. 653 57
Methuen,	. 1,095 31	Stoughton,	. 656 16 1
Middleborough, .	. 1,587 57	Stow,	. 841 80
Middleton,	. 1,255 041	Sudbury,	. 1,009 45
Millbury,	. 25 41	Sutton,	. 163 25
Millis,	. 418 23	Taunton,	. 163 00
Milton,	. 3,496 35	Templeton,	. 159 83
Nantucket,	. 20 00	Tewksbury,	. 1,268 84
Natick,	. 233 49	Tisbury,	. 75 50
Needham,	. 1,141 00	Topsfield,	. 632 06
Newbury,	. 989 51	Townsend,	. 849 92
Newton,	. 697 60	Tyngsborough, .	. 1,091 94
Norfolk,	. 187 85	Upton,	. 3 13
North Andover, .	. 1,055 79	Wakefield,	. 747 64
North Attleborough,	. 122 25	Walpole,	. 420 80
North Reading, .	. 932 92	Waltham,	. 2,548 971
Northborough, .	. 977 98	Watertown,	. 220 05
Norwell,	. 1,117 71	Wayland,	. 1,163 56
Norwood,	. 301 55	Wellesley,	. 1,684 50
Peabody,	. 652 00	Wellfleet,	. 619 06 1
Pembroke,	. 1,490 04	Wenham,	. 596 71
Pepperell,	. 691 03	West Boylston, .	. 167 66
Plainville,	. 81 05	West Bridgewater, .	. 351 87
Plympton,	. 283 74	West Newbury, .	. 568 15
Prescott,	. 16 30	Westborough,	. 402 25
Princeton,	. 275 41	Westford,	. 1,059 18
Quincy,	. 1.264 25	Westminster,	. 137 96
Raynham,	. 202 76	Weston,	. 2.634 12
Reading,	. 2,210 60	Wilmington,	. 1,243 02
Rehoboth,	. 494 441	Winchendon,	. 325 91
Revere,	. 47 40	Winthrop,	. 81 50
Rochester,	. 557 41 1	Woburn,	. 861 17
Rockport,	. 499 50	Worcester,	. 2,853 50 1
Rowley,	. 1,136 23	Wrentham,	. 1,735 161
Salisbury,	. 566 03		
Sandwich,	. 521 41		\$111,750 68
			,,

¹ This amount includes cost of sprayer.

Dover gypsy n	noth	fund										. \$936 75
State Forest C	omm	issio	n.			•	•			- •		. 119 43
State Forest C Prevention of General forestr Massachusetts	fores	t fire	s,				, .					. 59 27
General forestr	y an	d nu	rseri	es,								. 245 03
Massachusetts	Scho	ool fo	or Fe	eble-	minde	d,						. 1 45
Special North Purchase and p	Shor	e fur	ıd,		•	٠						, 8,793 53
							•	*	•			. 147 64
Lead sold, .				•	•	٠	•	•	•	۰		. 114 10
Thinning work Bird houses,				•	•	•		•	•	۰		. 445 78 . 154 53
Traveling spra								•	:			. 475 96
214101128 -2-10	,,								·	.•		
												\$11,493 47
APPROPRIAT	ION	F	OR S	SUPI	PRESS	SION	\mathbf{OF}	GYI	PSY	ANI	B	ROWN-TAIL
					\mathbf{M}	отн	s.					
					NCIAI			ENT.				
Balance on h	and,	, No	v. 30	0, 19	16,		• •					\$78,367 55
Less reimbur	seme	ent j	paid	for :	1916,							25,213 07
D 1		1015		,								
Balance	tor .	1917	WOI	k,		٠	٠	•	•	•	•	\$53,154 48
					Re	ceipt	S.					
Acton, .			۰						1	\$48	64	
Andover,				۰					;	820	20	
Arlington,										632	50	
Attleboro,										97	80	
Auburn, .										75	52	
Ayer, .									1.	151	87	
Barnstable,		•		·	·				-,	21		
Berkley, .		•	•	•	•	•	·	•		31		
Beverly, .	•	•	•	٠	•	•	•	•		545		
	•	٠	•	•	•	•	•	•		301		
Billerica,	•	•	•	•	•	•	•	•		100		
,		٠	٠	•	•	٠	٠	•				
Boylston,	٠	٠	•	•	•	٠	٠	•		491		
Brewster,	٠	•	•	•		•	•	•		200	78	
Cambridge,				•		•	•	•		308		
Canton, .						٠	•	•		595		
Cohasset,									2,	125	60	
Concord,									1,	160	79	
~	1 •									152	37	
Eastham,										3	73	
Easthampton										40	75	
Essex, .				,						720	28	
Foxborough,		•	•	•						163		
	•	•	•	•		•		•		281		
Franklin,	•	•		•		•	•	٠.		97		
Gardner,	•	· •	۰	•	•	•	•	•		91	00	

Amounts carried forward, \$9,967 48 \$53,154 48

Amounts brought forward, . . . \$9,967 48 \$53,154 48

. 1,181 60

6 06

Grafton,

Gloucester, . . .

Cartan	•								967 16		
Groton, .	•	•	. •	•	•	•	•	•	267 16		
Hamilton, Hingham,	٠	•	•	•	٠				431 55		
Hingham,	•	•			٠		•	•	1,422 00		
Holden, .	٠	•		•	٠		•	•	1,044 93		
Holliston,				•	•	•			157 13		
Hopkinton,	•				•	•			857 36		
Ipswich, .	٠	•		•		•	•	•	67 02		
Lakeville,			٠		٠	•	٠	•	564 23		
Lancaster,				•	•				203 75		
Lincoln, . Lowell, .	٠	٠.							137 05		
									1,392 69		
Lynnfield,									1,361 58		
Manchester,						•			316 25		
Marblehead,									158 50		
Marlborough	1,								358 69		
Medfield,									1,052 19		
Medford,									79 25		
Medway,									122 25		
Methuen,									49 98		
Millbury,								٠.	26 14		
Millis, .									370 83		
Milton, .									1,882 00		
Nantucket,									20 00		
					•				83 75	•	
Needham,									2,838 55		
Newton, .					·				5,983 41		
Newton, . North Andor North Attleb	ver.								287 33		
North Attleb	oro	ugh.							123 50		
Norwood,									301 55		
Peabody,									652 00		
Plainville,									66 33		
Drogoott							•	•	16 30		
Princeton,				•	•	•	•	•	751 55		
Quincy, .					•	•	•	٠	1,865 71		
Raynham,			٠		٠	٠	٠	•	5 92		
Rehoboth,		٠	•	•	•		•	•	4 08		
Revere, .	٠	٠	* •	•	٠	٠	•	•	47 40		
Rockport,		٠	٠	٠	٠	•		. •			
Rowley, .		•	•	•	٠	٠			499 50		
Sandwich	•	•	٠	•	۰	•	٠	•			
Sandwich, Saugus, .		٠	•	•		•		•	675 00		
baugus, .	•	٠	٠	•	•	•	•	٠	184 36		
Amounts	car	ried	forw	ard,			•		\$37,888 13	\$53,154	48

Amounts	bron	iaht	form	vard					227 000	10	050 154 4	
Amounts	0101	iyni	jord	vara,	•	•	•	•	\$37,888	13	\$53,154 48	3
Sharon, .									211	90		
Sherborn,									421	05		
Shirley, .									6	66		
Somerset,			٠,						64	00		
Sterling, .									45	06		
Stoneham,									191	30		
Stoughton,									38	81		
Sutton, .									163	96		
Taunton,									163	00		
Templeton,	•						۰		1,428	34		
Tisbury, .									75	50		
Topsfield,									2,479	83		
Truro, .									31	52		
Wakefield,			٠.						777	63		
Walpole,									326	00		
Waltham,	•				•				4,160	17		
Watertown,					•				220	05		
Wellesley,					•				1,684	50		
Wellfleet,									2	11		
Wenham,									41	10		
West Boylston	1,	•	٠				٠	•	718	71		
West Newburg							۰	٠	19	02		
Weston, .									723	49		
Winchendon,				٠					2,026	75		
Winthrop,									81	50		
Woburn,		•					۰		1 :			
Worcester,						٠	٠		2,285			
Gardner State							•		6			
Massachusetts									1 4			
Massachusetts	Hig	hwa	ay C	omm	issio	n,			2,722			
Levi H. Green	WOO	d,				٠			81			
Fitzhenry-Gur E. S. Jenness,	otill (Con	npar	ıy,					24 4			
E. S. Jenness,							٠	•	6			
R. S. Langdell Paul D. Kneel	, .			•			٠	•	8 :			
Paul D. Kneel	and	(ex	pens	es),					7 2			
Paul D. Kneel				thinr	ning	work	ς),		1,535 (
For bird house						9.		•	157 2			
For barrels sol	d, .		•				۰	٠	21			
For gasoline so For old tires so	old, .		•			•		•	2 (
For old tires se	old,	-		•	•	•	•	•	2 4			
Rebate from V							٠	•		25		
Checks returne							٠	•	11 7			
Checks returne	ed fr	om	Dux	bury	,	•	•	•	61 4	£9		

Amounts carried forward, \$60,926 53 \$53,154 48

Amounts brought forward, \$60,926 53	\$53,154 48
Transfers for supplies: —	
General forestry and nurseries,	
Purchase and planting of forest lands, 147 64	
Special North Shore fund, 8,991 53	
Dover Gypsy Moth fund, 1,932 60	
State Forest Commission, 4 23	
Appropriation for investigation and suppres-	
sion of white pine blister rust, 1,446 07	
	73,836 36
	\$126,990 84
Appropriation of 1917,	165,000 00
rippropriation of roating to the contract of t	
	\$291,990 84
Expenditures.	
Pay roll,	
Travel, 8,886 77	
Supplies,	
Rent of store,	
Storehouse equipment,	
Special work,	
Town pay rolls,	
Reimbursements,	
Thinning work,	
Printing,	
Stationery and postage, 85 35	
Experts,	
Sundries,	
	- 230,824 57
Balance Nov. 30, 1917,	. \$61,166 27

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

In the following table we show the expenditures in detail for the year 1917. We also have indicated in the second and third columns of figures the amount received by each town or city for the years previous to and including 1917, — in the first column, the amounts received in the years 1905 to 1909, inclusive, and in the second column the amounts received for the years 1910 to 1917, inclusive. The last group of years covers the period since the establishment of our storehouse, during which we have furnished supplies to various towns and cities. The amounts given in supplies are included in the totals.

Critics AND TOWNS. Class. 1965 Logidius Logid			TOTAL AMOUNT RE-	OM STATE.			19	1917.			1918.
x x x x x x x x x x x x x x x x x x x x	CITIES AND TOWNS.		1905 to 1909, in- clusive.	1910 to 1917, in- clusive.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Reim- bursement.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
matrice 3 6,607 90 \$9,974 52 1,007 59 \$1,113 76 \$588 441 \$106 17 \$861 35 \$967 52 3 - </td <td>Abington,</td> <td>es</td> <td>\$2,289 72</td> <td>1</td> <td>\$1,498 09</td> <td>1</td> <td>1</td> <td>1</td> <td>ı</td> <td>1</td> <td>\$1,472 36</td>	Abington,	es	\$2,289 72	1	\$1,498 09	1	1	1	ı	1	\$1,472 36
matrice 3 — — 516 42 — <t< td=""><td>Acton,</td><td>က</td><td>6,507 90</td><td>\$9,974 52</td><td>1,007 59</td><td>\$1,113 76</td><td>\$589 441 75 90</td><td>\$106 17</td><td>\$861 35</td><td>\$967 52</td><td>827 15</td></t<>	Acton,	က	6,507 90	\$9,974 52	1,007 59	\$1,113 76	\$589 441 75 90	\$106 17	\$861 35	\$967 52	827 15
matrice 378 10 — 2,910 97 — 5.0 — — — — 5.0 — — — — 5.0 — — — — 5.0 — — — 5.0 — — 5.0 — — — 5.0 — — — 5.0 —	Acushnet,	63	1	1	516 42	1	E .	ı	ı	ı	609 16
am,	Amesbury,	2	378 10	1	2,910 97	ı	1	ī	1	ı	2,840 50
nn	Andover,	2	6,481 29	8.967 09	3,570 38	3,938 47	1,670 84	1	1,586 70	1,563 83	3,126 90
rnham,	Arlington,	-	32,589 84	4,343 41	2,000 00	1	1	1	632 50	ı	2,000 00
id,	Ashburnham,	60	1	3,351 16	503 74	1,066 99		563 25	362 76	926 01	528 33
id,	Ashby,	က	1	3,309 52	319 16	812 52	305 361	493 36	426 94	920 30	272 16
oro,	Ashland,	3	716 70	2,441 14		498 56	182 45	ı	508 19	434 94	637 91
oro,	Athol,	63	1	1	2,708 91	1	1	ı	ı	1	2,833 00
n,	Attleboro,	1	1	ı	2,000 00	1	1	1		1	2,000 00
	Auburn,	63	1	131 80	735 02	1	1	1		1	802 25
	Avon,	es	ı	1,646 87	467 46	518 48		51 02	124 45	175 47	480 95
	Ayer,	8	1	1,992 49		562 77	29 75	ı	340 27	12 62	984 00
The state of the s	Barnstable,	63	1	2,388 43	3,721 72	ı	1	ı	6 32		3,239 86

1 Arsenate of lead sold.

1918.	Required Expendi- ture.	\$1,167 38	773 75	461 15	4,718 18	245 02	256 88	5,000 00	2,429 99	595 51	312 86	5,000 00	2,305 92	124 72	370 73	232 98	3,707 81	1
	Total Amount received from State.	1	\$1,626 41	1	1	362 45	905 08	1	1,034 39	1	751 01	1	'	1,458 89	1,369 29	770 38		
	Tools supplied.	1	\$1,139 23	1	ı	488 93	489 37	545 55	1,398 26	1	753 97	1	1	692 97	731 06	66 17	1	1
7.	Reim- bursement.	ı	\$487 18	-	1		415 71	,	,	'	1	1	1	765 92	638 23	704 21	1	
1917.	Private Work.	1	\$111 801 933 22	1	1	82 49	{ 110 651 114 09	1	{ 409 411 318 43	,	122 75	'	1	{ 513 091	374 021 179 00	158 43	1	
	Total Net Expenditure.	ı	\$1,343 21	1	1	230 84	685 51	1	1,948 19	ı	435 05	1	1	99 888	1,217 79	938 50	1	
	Required Expendi- ture.	\$1,137 36	856 03	443 66	2,000 00	238 32	269 80	2,000 00	2,312 06	1,004 08	438 01	5,000 00	3,112 44	122 74	579 56	234 29	3,989 75	04 047
OUNT RE-	1910 to 1917, in- clusive.	1	\$23,940 12	•	584 34	738 57	7,443 59	666 02	11,487 39	,	7,729 60	86,774 69	ı	13,279 83	14,563 00	3,001 25	1,535 76	
TOTAL AMOUNT RE- CEIVED FROM STATE.	1905 to 1909, in- clusive.	ı	\$22,022 24	1	10,183 53	ı	888 65	5,189 97	14,746 70	1	1,320 10	28,956 26	2,280 62	4,160 18	7,068 76	ı	1,445 27	1
	Class.	ಣ	က	ಣ	1-2	es	က	-	3-2	es	m	-	2-3	က	က	က	7	c
		•	•	•	•	•	•	•	•	٠	•	٠	•	•	٠	•	٠	
		•	•	•	٠	٠	•	٠	٠	•	٠	٠	٠	٠	٠	•	٠	,
	Towi		•	•	•	•	•		•	•		•	•	•	•	•	•	•
	AND																	
	CITIES AND TOWNS.		Bedford, .	Bellingham,	Belmont, .	Berkley, .	in, .	Beverly, .	Billerica,	Blackstone,	on, .	ou,	rne, .	Boxborough,	Boxford, .	Boylston,	Braintree,	Brewster.
		Barre,	Bedf	Belli	Belm	Berk	Berlin,	Beve	Bille	Black	Bolton,	Boston,	Bourne,	Boxb	Boxf	Boyl	Brair	Brew

1,796 44	268 87	6,000 00	599 01	5,000 00	420 44	5,000 00	2,057 99	210 13	828 47	580 48	893 48	1,915 91	6,000 00	164 33	3,890 97	2,466 12	2,761 80	182 48	3,180 27	2,250 78	5,000 00
587 33	1	,	1	1	1,376 43	1	1,836 76	1,789 33	5,862 24		ı	1,321 41	1	1	1	1	1	1	956 43	1	-
612 76	1	1	1	ı	614 99	1	2,295 95	586 26	275 27	ı	1	1,384 67	1	8	1	2,125 60	80 709	1	1,036 14	1	ı
-	1	,	1	1	761 44	1	ı	1,203 07	5,586 97	ı	1	1	1	1	1	ı	1	1	ı	1	I
\$1 961 722 20	1	1	1	1	285 13	8	2,287 45	644 21	1,969 96	1	1	1,007 83	1	1	1	1	ı	1	1,057 79	ı	1
1,757 42	1	1	,	1	1,168 08	ı	3,572 40	1,445 73	6,444 22	1	1	1,779 78	1	1	ı	1	1	t	3,613 21	ı	t
1,782 85	257 58	6,000 00	624 88	8,000 00	406 64	2,000 00	2,815 38	242 66	857 25	573 67	004 21	1,843 04	00 000'9	168 42	3,822 20	3,952 08	4,145 07	185 91	3,453 81	2,472 37	5,000 00
8,183 19	'	1	1	60 99	15,586 62	ı	13,719 14	21,143 93	19,548 84	1 25	1	11,435 25	1	1	ı	11,838 67	12,157 38	1	11,961 13	1	2,250 93
143 48	1	1	1		18,155 01	4,059 36	1	12,936 37	4,905 38	ı	1	0,788 40	ı	ı	t	4.360 18	15,882 29	ı	19,661 59	1	1
60	63	1	60	1	89		2-3	89	60	00	60	00	1	60	63	63	63	က	23	2-3	1
	٠	•			•	•	•		•	•	•	•		•	٠	•	٠	٠	•	٠	•
	٠		٠	•	٠	٠	٠	٠	٠			٠		٠		٠	٠	٠	٠	•	
	٠	٠	٠	٠	٠	٠	٠	•	٠	•	٠	٠	٠	٠		•	•	٠	•	•	
	•	•	•	•				•	•		•	٠	•	•	•	•		•		•	.
		٠.	•	•		•	٠	•	•	•	•		•	•		•	•	•	•		
Bridgewater,	Brimfield,	Brockton,	Brookfield,	Brookline,	Burlington,	Cambridge,	Canton, .	Carlisle, .	Carver, .	Charlton,	Chatham,	Cholmsford,	Chelsea, .	Chilmark,	Clinton, .	Cohasset, .	Concord, .	Dana, .	Danvers, .	Dartmouth,	Dedham, .

Arsenate of lead sold.

		TOTAL AN CEIVED FR	TOTAL AMOUNT RE-			1917.	Л.			1918.
CITIES AND TOWNS.	Class.	1905 to 1909, in- clusive.	1910 to 1917, in- clusive.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Reim- bursement.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Decrifield,	က	ı	11	\$1,101 28	ı	8	2	ı	1	\$1,360 46
Dennis,	က	1	1	620 02	ı	ı	1	1	ı	509 13
Dighton,	က	1	ı	754 62	ı	1	ı	t	ı	860 61
Douglas,	က	1	1	764 57	1	ı	ı	ı	1	568 38
Dover,	2-3	\$6,460 75	\$1,054 85	3,652 23	ı	I	ı	t	ı	1,000 71
Draeut,	က	4,077 88	9,798 79	1,060 90	\$1,529 00	\$728 50	\$468 00	\$1,251 11	\$1,719 11	1,095 00
Dudley,	က	1	ı	1,008 86	ı	ı	1	ı	1	969 54
Dunstable,	က	2,181 31	9,410 46	284 99	934 31	342 33	649 32	208 80	1,158 12	144 52
Duxbury,	က	5,147 30	1	1,426 07	2,608 10	1,000 03	1,182 03	1,182 72	2,364 75	1,268 17
East Bridgewater,	က	5,600 72	2,414 16	1,169 82	1	t	1	1 50	t	1,307 24
Eastham,	က	ι	1	187 54	ı	ı	1	3 73	ı	175 82
Easthampton,	5	1	ı	3,217 03	110 24	1	ı	40 75	ı	3,925 74
Easton,	2-3	ı	1,058 40	3,049 75	ı	ı	1	1	1	1,618 75
Edgartown,	က	1	1	610 35	1	1	ı	ı	ı	635 11
Essex,	က	7,041 13	5,363 69	538 51	703 09	386 25	164 58	254 44	419 02	518 83
Everett,		1	1	2,000 00	1	t	1	ı	ı	5,000 00
Fairhaven,	က	1	t	1,978 57	1	ı	1		1	2,250 83

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¹ Arsenate of lead sold.

Fall River,			-	1	1	1	5,000 00 1	1	1	1	1	1	2,000 00	
Falmouth,	•	٠	•	1-2	ı	2 20	2,000 00	1	1	I	1	ı	2,774 32	- 1
Fitchburg,	•		•	1	1	6 73	2,000 00	ı	ı	1	1	1	5,000 00	
Foxborough,			•	65	1	ı	1,134 26	1	ı	1	1	1	1,146 04	
Framingham,	•		•	1	1,161 04	1	5,000 00	1	1	1	t	ą.	2,000 00	
Franklin,	٠		•	es	1	ı	2,391 85	160 00	1	1	81 50	1	2,155 79	
Freetown,	٠		•	60	1	1	455 91	1	1	1	1	ı	474 24	
Gardner,				53	1	ı	4,765 91	1		1	1	1	4,296 30	
Georgetown,				co	4,112 34	12,472 67	550 15	820 54	$\left\{ \begin{array}{cc c} 50 & 40^{1} \\ 638 & 77 \end{array} \right\}$	270 39	648 54	918 93	533 93	
Gloucester,				1	3,764 24	ı	2,000 00	2,547 09	,	ı	446 62	ı	5,000 00	
Grafton,	•			65	ı	1	1,532 05	700 52	185 00	1	4 23	ı	1,334 07	
Great Barrington, .	•			53	ı	72	3,533 27	1	1	ı	ı	1	3,469 34	
Greenfield,	•	٠		gard.	ı	2 01	2,000 00	1	1	1	1	1	5,000 00	
Groton,	•	٠		60	196 72	6.777 81	2,037 92	1	ı	1	1	1	1,124 62	
Groveland,			•	က	4,508 99	7,250 30	566 94	804 93	$\left\{ \begin{array}{cc} 66 & 77^{1} \\ 322 & 24 \end{array} \right\}$	237 99	1,082 96	1,320 95	577 09	
Halifax,	٠		•	co	3,660 87	4,739 17	297 00	1,022 55	282 24	725 55	250 10	975 65	295 75	
Hamilton,			•	2-3	8,394 78	9,451 28	2,948 14	2,823 69	1,410 37	ı	96 686	10 039	1,471 49	
Hanover,	•		•	60	6,788 22	11,401 06	953 27	1,817 50	380 81	864 23	918 74	1,782 97	725 05	
Hanson,	•			6	2,993 36	6,331 24	675 21	725 45	$\left\{ \begin{array}{cc c} 28 & 321 \\ 659 & 35 \end{array} \right\}$	50 24	304 06	354 30	808 13	
Harvard,	•			က	1,365 01	10,718 88	888 02	1,554 75	$\left\{ \begin{array}{cc c} 647 & 971 \\ 403 & 11 \end{array} \right\}$	666 73	1,054 19	1,720 92	758 79	
Harwich,				က	1	797 05	748 76	60 962	109 65	47 33	254 13	301 46	759 81	
Haverhill,	•			1	1,418 14	696 72	2,000 00	I	1	ı	ı	ı	2,000 00	
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				TOTAL AMOUNT RE-	OM STATE.			1917.	17.			1918.
CITIES AND TOWNS	OWNB.	· inch	Сваяв.	1905 to 1909, in- clusive.	1910 to 1917, in- clusive.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Roim- bursement.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Hingham,			2	\$6 990 52	\$4,452 11	\$3,606 14	1	ı	-	\$1,422 00	1	\$2,740 55
Holbrook,			8	ı	712 66	748 20	\$759 00	\$7 001 285 14	-	265 29	\$265 29	696 49
Holden,		•	8	ı	5,972 03	805 27	2,112 61	326 05	\$1,307 34	195 46	1,502 80	752 17
Holliston,			60	t	28	1,289 56	1	t	1	156 35		800 29
Hopedule,		٠	2-3	t	ı	3,507 84	ı	t	ı	1	r	1,023 46
Hopkinton,		•	60	1,320 48	1,464 69	795 86	819 67	32 85	23 81	142 06	165 89	751 34
Hubbardston,		•	က	ı	169 69	322 27	ı	ı	ī	1	1	326 63
Hudson,		•	က	2,266 68	4,407 88	1,752 91	1,867 36	20 902	ı	562 80	562 80	1,750 70
Hull,		•	2	1	ı	3,882 18	1	t	1	ı	1	4,112 01
Ipswich,		٠	2-3	7,240 22	11,237 13	2,419 40	2,548 33	\ 726 21 1 753 39		1,134 02	1,010 36	2,211 59
Kingston,			က	1,750 64	8,026 30	00 200	892 03	291 14	194 43	12 36	206 79	638 84
Lakeville,			က	ı	1,660 22	531 77	670 05	186 59	138 28	199 95	338 23	478 23
Lancaster		•	2-3	ı	51	2,825 00	1	1	í	203 75	1	957 23
Lawrence,		٠	1	ı	ı	2,000 00	ı	ı	ı	t	\$	2,000 00
Leicester,		٠	8	1	1	1,019 31	f	t	ŧ	1	1	950 44
Lenox,		•	7	ı	7.2	3,378 92	ı	ī	ı	1	t	2,918 70
Leominster,		-	1	1	1 80	2,000 00	1	í	ı	1	1	00 000'9

Lexington,			_	-	37,954 69	23,627 37	4,087 50	3,807 71	1,543 80	-	1,805 03	1,220 19	3,396 08
Leyden, .				60	ı	-	96 36	1	1	4	í	1	60 66
Lincoln, .				00	11,231 98	17,954 34	1,694 02	2,239 30	1,814 35	1	2,591 89	2,487 17	755 21
Littleton,				es	3,054 50	8,944 76	529 29	101 55	{ 572 991 77 60		1,033 00	605 26	516 45
Lowell, .				1	1	2,235 40	2,000 00	1	1	1	845 26	1	2,000 00
Lunenburg,				69	81 34	9,026 69	618 19	1,033 48	$\left\{\begin{array}{cc} 197 & 60^1 \\ 995 & 31 \end{array}\right]$	355 29	1,056 11	1,411 40	668 27
Lynn, .		į		1	23,169 11	1	2,000 00	1		ı	ı	ı	2,000 00
Lynnfield,				es	12,922 81	17,397 91	576 85	1,807 77	728 87	1,230 92	1,013 35	2,244 27	603 05
Malden, .		į		1	7,973 93	537 52	6,000 00	1	ı	ı	809 74	ł	2,000 00
Manchester,				1-2	1	1	5,000 00	1	ı	1	359 51	ı	4,441 58
Mansfield,				es	1	1	1,870 49	1	1	1	11 14	1	1,886 67
Marblehead,				2	1,299 58	1	4,675 52	ı	1	ı	158 50	ı	4,439 43
Marion, .			-	2-3	ı	1	2,427 97	ı	1	ı	1	1	1,289 42
Marlborough,				7	1,806 21	6,631 64	4,564 27	4,831 20	2,114 68	1	1,105 47	506 32	4,457 76
Marshfield,				က	3,384 23	11,293 21	1,122 79	1,593 36	84 631 1,253 96	470 57	1,260 73	1,731 30	1,038 17
Mashpee, .				က	543 82	9,934 41	164 20	1,687 55	1,266 52	1,523 35	537 21	2,060 56	185 57
Mattapoisett,				60	1	ı	1,081 48	1	1	ł,	1	1	733 01
Maynard,				က	3,277 64	989 44	1,730 40	ı	i	. 1	ı	1	1,874 24
Medfield, .				က	ı	2,044 95	1,007 37	1,426 42	736 99	362 60	98 999	869 45	857 89
Medford, .				-	22,858 83	4,208 13	2,000 00	1	1	ı	79 25	1	2,000 00
Medway, .				က	,	1	747 00	1	ı	ı	122 25	1	766 34
Melrose, .				1	9,558 67	ı	5,000 00	ı	ı	1	1	1	2,000 00
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¹ Arsenate of lead sold.

TOTAL AMOUNT RE-
CEIVED FROM STATE.
Class. 1905 1910 to 1909, in- to 1917, in- clusive. clusive.
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\$3,446 00
8,112 94
385 96
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174 07	197 89	698 89	4,531 57	2,000 00	472 55	2,159 71	3,371 41	786 56	439 46	777 62	2,052 11	701 16	505 42	2,000 00	865 02	157 15	1,586 90	560 42	855 22	2,356 77	170 68
ı	1	1,402 77	ı	1	349 50	887 87	1	1	2,466 46	1,280 30	ı	1	1,191 68	1	1	ı	1	1	ı	ı	ı
1	1	989 51	1	09 469	187 85	1,055 79	122 25	1	932 92	977 98	1	ı	1,117 711	301 55	1	1	1	6	1	1	1
1	1	413 26	1	1	161 65	-	1	1	1,533 54	302 32	1	1	73 97	1	ı	1	1	ı	ı	1	1
1	1	{ 441 851 584 59	1	1	178 30	83 451 708 08	1	ı	681 31	165 601	1	1	921 33	ı	ı	1	1	1	1,	ŧ	1
1	1	1,127 91	ı	ı	640 04	2,506 27	1	1	1,949 14	1,140 96	1	1	614 89	1	ı	ı	ı	ı	ı	ı	t
172 77	167 56	714 65	6,000 00	8,000 00	478 39	2,452 22	3,744 14	802 89	415 60	838 64	2,326 80	681 27	540 92	6,000 00	821 11	149 10	1,632 86	2,346 06	854 07	2,287 93	172 87
1		15,854 17	1	42,469 09	2,241 11	7,575 64	,1	1	21,919 57	6,777 78	1	1	9,872 63	1 40	ı	1	ı	40	1	1	6 84
1	1	12,627 11	1	13,130 78	1	6,283 31	,	1	8,394 87	1	J	1	3,818 68	1	1	1	ı	1	ı	1	ı
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1 Arsenate of lead sold.

		TOTAL AN	TOTAL AMOUNT RE- CEIVED FROM STATE.			1917.	Т.			1918.
Сгитва амо Тоwns.	Class.	1905 to 1909, in- clusive.	1910 to 1917, in- clusive.	Required Expendi-	Total Net Expendi-	Private Work.	Reim- bursement.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Peabody,	1	\$16,750 89	\$2,313 14	\$5,000 00	ι	1	ı	\$652 00	1	\$5,000 00
Pembroke,	က	2,010 07	14,411 44	528 25	\$1,679 31	\$985 00	\$1,151 06	1,490 04	\$2,641 10	513 71
Pepperell,	က	1,616 38	11,691 88	77 876	1,874 22	297 27	895 45	691 03	1,586 48	973 33
Petersham,	က	1	•	468 73	ι	ı	1	1	ı	409 08
Phillipston,	က	ı	6 84	131 86	ſ	1	1	1	1	131 28
Plainville,	က	1	520 60	428 75	473 99	180 18	45 24	81 05	126 29	438 51
Plymouth,	1	1	t	00 000'9	1	ı	t	1	ı	2,000 00
Plympten,	က	7,945 65	13,011 74	188 57	1,508 13	135 00	1,319 56	283 74	1,603 30	198 07
Princeton,	က	ı	14,068 60	902 84	2,787 97	132 30	1,885 13	275 41	2,160 54	438 93
Provincetown,	က	1	1	1,111 97	1	ı	1	•	1	1,065 05
Quincy,	1	2,170 39	2,152 52	2,000 00	1	1	1	1,264 25	1	2,000 00
Randolph,	က	1	92 74	1,176 00	1		,	1	ı	1,120 90
Raynham,	က	70 80	1,305 70	402 67	369 09	142 24	•	202 76	169 18	409 97
Reading,	7	22,665 08	14,336 52	3,327 59	3,249 95	2,276 50	1	2,210 60	1,706 37	3,087 12
Rehoboth,	က	ı	197 78	432 90	261 24	273 31	1	494 44	197 78	446 94
Revere,	1	1,615 16	ı	2,000 00	ı	1	1	47 40	ı	2,000 00
Rochester,	60	195 09	446 35	425 37	333 44	10 43	ŧ	557 41	340 48	425 89

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2,091 69	1,674 62	388 92	321 46	380 48	5,000 00	753 44	538 70	2,979 20	2,290 97	805 78	1,360 82	655 04	551 63	1,370 92	775 25	5,000 00	867 82	1,394 44	2,000 00	545 18	1,783 43
ı	1	1,130 83	1	1	1	1,092 01	426 13	545 46	1,315 01	1	1,128 79	954 93	887 16	1,224 54	ı	1	943 74	1	1	553 28	ı
-	499 50	1,136 23	1	•	1	566 03	521 41 .	810 27	1,352 95	1	1,740 69	889 36	562 80	293 30	١.	1	548 56	1	ı	362 49	1
1	1	ı	1	1	à	\$ 525 98	1	1	232 65	ı	1	65 57	324 36	931 24	1	ı	395 18	1	ı	190 79	,
1	1	349 73	1	1	1	{ 131 401 364 14	100 081	322 24	2,087 90	1	8 64	682 14	$\left\{\begin{array}{cc} 102 & 00^1 \\ 385 & 15 \end{array}\right.$	496 30	1	1	709 93	ı	1	149 65	1
ı	1	919 03	ı	1	4	1,242 98	526 72	2,804 45	3,051 88	1	2,438 44	1,074 61	868 60	2,269 73	260 50	1	1,380 82	1	1	850 17	1
2,211 25	1,672 14	924 43	303 60	371 92	2,000 00	217 00	622 00	2,932 00	2,422 83	839 81	1,578 09	1,009 04	544 24	1,338 49	753 53	2,000 00	985 64	1,462 28	2,000 00	559 38	1,828 02
1,131 13	1,337 64	7,110 56	24 46	1	365 56	10,038 89	2,504 50	19,145 56	26,979 25	1	1,128 79	4,796 20	4,344 04	1,265 76	1	1	5,740 36	1	1	5,018 73	1
868 39	1,963 08	3,662 32	1	1	11,844 56	7,432 39	622 91	55,011 99	1,351 60	1	t	3,726 29	1	1	ı	427 52	3,586 16	ı	1	1	1
60	60	60	60	က	7	es	က	63	2-3	က	က	က	65	က	က		က	က	1	က	က
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Rockland,	Rockport,	Rowley, .	Royalston,	Rutland, .	Salem, .	Salisbury,	Sandwich,	Saugus, .	Scituate, .	Seekonk, .	Sharon, .	Sherborn,	Shirley, .	Shrewsbury,	Somerset,	Somerville,	Southborough,	Spencer, .	Springfield,	Sterling, .	Stockbridge,

			TOTAL AN	TOTAL AMOUNT RE- CEIVED FROM STATE.			19	1917.		•	1918.
CITIES AND TOWNS.		Class,	1905 to 1909, in- clusive.	1910 to 1917, in- clusive.	Required Expendi- ture.	Total Net Expendi- ture.	Private Work.	Reim- bursement.	Tools supplied.	Total Amount received from State.	Required Expendi- ture.
Stoneham,		67	\$26,874 45	\$7,363 59	\$2,499 86	\$2,499 86	\$1,483 85	t	\$653 57	\$522 86	\$2,544 14
Stoughton,	-	ಣ	ı	2,285 61	1,925 92	1,887 91	541 09	1	656 16	492 15	1,953 36
Stow,	-	es	2,117 79	10,201 23	464 29	1,102 81	8 335 28 335 28	\$313 02	841 80	1,154 82	404 70
Sturbridge,		63	ı	1	382 53	ı	1	ı	1	ı	377 30
Sudbury,		က	4,474 07	12,682 46	672 37	1,210 43	{ 467 791 272 94	\$ 538 06	1,009 45	1,547 51	577 93
Sutton,		က	1	τ	618 76	ı	ı	ı	163 25	t	615 46
Swampscott,	٠	-	6,903 06	397 71	2,000 00	ŧ	ı	ı	ı	ŧ	2,000 00
Swansea,	٠	က	í	ι	810 01	1	1	1	ı	ı	717 36
Taunton,	•	-	ı	1	2,000 00	ı	1	1	163 00	1	2,000 00
Templeton,	•	က	1	2,923 07	819 06	1,132 28	346 00	313 22	159 83	473 05	838 65
Tewksbury,	•	က	5,196 08	14,060 63	988 44	1,830 85	631 83	842 41	1,268 84	2,111 25	1,080 63
Tisbury,		က	ı	1	970 27	1	1	ı	75 50	1	837 94
Topsfield,		့ဇာ	6,472 26	5,556 47	2,071 56	1,596 69	371 18	1	632 06	157 19	835 27
Townsend,		က	1	8,464 75	585 99	1,140 33	104 421 429 36	\$ 554 34	849 92	1,404 26	557 20
Truro,		က	1	192 71	220 42	221 00	11 67	1	1	1	213 19
Tyngsborough,	•	က	4,512 39	17,701 66	334 41	2,369 99	54 60 ¹ 844 32	3 2,035 58	1,091 94	3,127 52	344 27
Upton,	-	8	ı	ı	524 31	'	ı	1	3 13	ı	16 009

1,622 92	2,000 00	2,875 16	6,000 00	2,102 10	2,424 35	1,055 77	181 58	5,000 00	948 84	2,383 03	2,000 00	322 69	228 18	843 92	436 90	755 60	406 41	232 34	1,333 93	929 94	394 05
-	1	ľ	1	1	ı	t	1	1	802 73	ı	ı	575 36	ı	ı	368 95	903 29	697 82	8	748 01	ı	798 82
•	546 92	420 80	2,548 97	1	1	1	i	220 05	1,163 56	ı	1,684 50	90 619	1	12 969	167 66	351 87	568 15	ţ	402 25	1,059 18	137 96
ı	1	1	1	1	1	,	1	ı	1	1	1	81 30	í	1	201 29	551 72	129 67	t	345 76	1	98 099
1	ı	1	3,002 48	1	ı	ı	1	1	\$ 588 401 993 38	ı	1	86 45	1	431 46	320 20	397 65	(111 321) 288 44	1	910 33	ı	149 27
ı	1	1	12,383 02	1	ı	1	ı	1	997 93	. 1	ı	546 81	ı	1,565 55	650 74	1,355 48	584 38	1	1,673 44	eo	1,066 10
64	8	53	8	37	98	68	23	9	92	51	8	51	88	94	45	92	11	81	89	20	24
1,851	2,000	3,064	2,000	2,178	2,601	1,088	188	5,000 00	1,358	3,685 8	2,000 (340	223	1,465 94	449	803 76	454	256	1,327	991	405
- 1,851	2,425 09 5,000	1,029 76 3,064	8,458 76 5,000	- 2,178		- 1,088		2 55 5,000 (12,250 86 1,358	- 3,685	662 96 5,000 (575 36 340 8	- 223	9,023 67 1,465	1,857 87 449	7,437 90 803 7	7,711 43 454 7	- 256	3,176 73 1,327		
- 1,851	2,000	76 3,064	2,000	- 2,178		1,088 8		22	1,358	3,685	2,000	340	- 223		87 449	_	454	- 256	1,327	166	66 405
3 - - 1,851	2,425 09 5,000	76 3,064	8,458 76 5,000	3 - 2,178		3 1,088 8		2 55	12,250 86 1,358	- 3,685	662 96 5,000	340	3 - 223	9,023 67	87 449	7,437 90	7,711 43 454	3 - 256	3,176 73 1,327	15,572 952 991	6,257 66 405
. 3 - - 1,851	2,425 09 5,000	76 3,064	8,458 76 5,000	. 3				2 55	12,250 86 1,358	- 3,685	662 96 5,000	340	. 3 - 223	9,023 67	87 449	7,437 90	7,711 43 454	. 3	3,176 73 1,327	15,572 952 991	6,257 66 405
1,851	2,425 09 5,000	76 3,064	8,458 76 5,000					2 55	12,250 86 1,358	- 3,685	662 96 5,000	340	3	9,023 67	87 449	7,437 90	7,711 43 454	3	3,176 73 1,327	15,572 952 991	6,257 66 405
1,851	2,425 09 5,000	76 3,064	8,458 76 5,000					2 55	12,250 86 1,358	- 3,685	662 96 5,000	340		9,023 67	87 449	7,437 90	7,711 43 454		3,176 73 1,327	15,572 952 991	6,257 66 405
1,861 - 3 - - 1,861	2,425 09 5,000	76 3,064	8,458 76 5,000			3		2 55	12,250 86 1,358	- 3,685	662 96 5,000	340		9,023 67	87 449		7,711 43 454		3,176 73 1,327	15,572 952 991	6,257 66 405
1,861 - 8	2,425 09 5,000	76 3,064	8,458 76 5,000	3 - 2,178		3 8		2 55	12,250 86 1,358	- 3,685	662 96 5,000	340	endell,	9,023 67	87 449	7,437 90	7,711 43 454	est Tisbury,	3,176 73 1,327	15,572 952 991	6,257 66 405

² These figures only to 1916.

1 Arsenate of lead sold.

³ These figures not in for 1917.

		TOTAL AMOUNT RE- CEIVED FROM STATE.	OUNT RE-			1917.	л.			1918.
CITUS AND TOWNS.	Class.	1905 to 1909, in- clusive.	1910 to 1917, in- clusive.	Required Expendi-	Total Net Expendi- ture.	Private Work.	Reim- bursement.	Tools supplied.	Total Amount roceived from State.	Required Expendi-
Weston,	1-3	\$21,106 61	\$19,600 80	\$5,000 00	\$3,085 85	\$2,479 95	,	\$2,634 12	\$359 98	\$1,997 26
Westport,	က	1	ı	1,063 72	ı	1	ı	1	1	1,102 16
Westwood,	က	ı	1,028 30	2,370 23	1	ı	ı	ı	8	080 30
Weymouth,	1	3,639 99	2,798 00	2,000 00	1	1	ı	1	ı	2,000 00
Whately,	က	ı	5 26	301 28	1	ı	ı	ı	8	319 17
Whitman,	2-3	1	1	2,465 83	ı	1	1	ı	1	2,270 11
Wilmington,	က	10,969 96	21,272 13	875 87	2,123 39	956 02	\$1,247 52	1,243 02	2,490 54	864 35
Winchendon,	က	ı	4,625 85	1,787 01	2,837 56	515 54	1,050 55	325 92	1,376 47	1,791 56
Winchester,	1	14,875 11	ŧ	5,000 00	1	ı	1	1	1	2,000 00
Winthrop,	-	1	1	5,000 00	1	1	1	81 50	1	2,000 00
Woburn,	1	22,460 09	21,504 96	2,000 00	5,956 90	1,019 80	1	861 17	861 17	2,000 00
Worcester,	-	1	2,990 71	2,000 00	9,582 70	4,456 85	1	2,853 50	750 00	2,000 00
Wrentham,	က	1	643 33	660 53	193 70	227 85	1	1,735 16	643 33	680 35
Yarmouth,	es	i	1	1,025 43	1	1	ı	1	ı	731 25

MEETINGS AND ADDRESSES.

The department has had the usual calls for addresses and talks from various organizations, and the following list gives the names of various associations that have been attended:—

Acton Woman's Club.

Needham and Wellesley Farmers' Club.

Eastern Foresters' Association, Washington, D. C.

American Forestry Association.

Haverhill Unitarian Church Men's Club.

New England Nurserymen's Association, New London, Conn.

Forest Owners' Club, New York City, N. Y.

Farmers' Institute, Ashby.

Massachusetts Horticultural Society.

Worcester County Harvest Club, Worcester.

New England Federation for Rural Progress.

Waban Beacon Club.

Massachusetts moth superintendents' meeting.

Massachusetts Tree Wardens' and Foresters' Association.

Forest Fire Insurance Association, Concord, N. H.

Shirley Farmers' Club.

Berlin Tuesday Club.

Eastern Lumbermen's Association, Bangor, Me.

University of Maine, Forestry School.

Congregational Club, Auburndale.

Eastern Shook and Wooden Box Association.

Boston City Club.

Walpole Arbor Day Celebration.

Farmers' Institute, Edgartown.

Eastern Foresters' Association, Plattsburg, N. Y.

Cape Cod Cranberry Association, Wareham.

Stockbridge Town Club.

Nantucket citizens' meeting.

Cape Cod moth officials, Bourne.

Westford Grange.

Hampshire County Pomona Grange.

Worcester and Norfolk Pomona Grange.

Society for the Promotion of Agricultural Science, Washington, D. C.

Massachusetts State Board of Agriculture.

Massachusetts State Grange.

Appalachian Mountain Club, Director.

Berlin Men's Club.

Duxbury, Mayflower Pomona Grange.

Medfield, Conservation Committee of Federation of Women's Clubs.

Foxborough Grange.

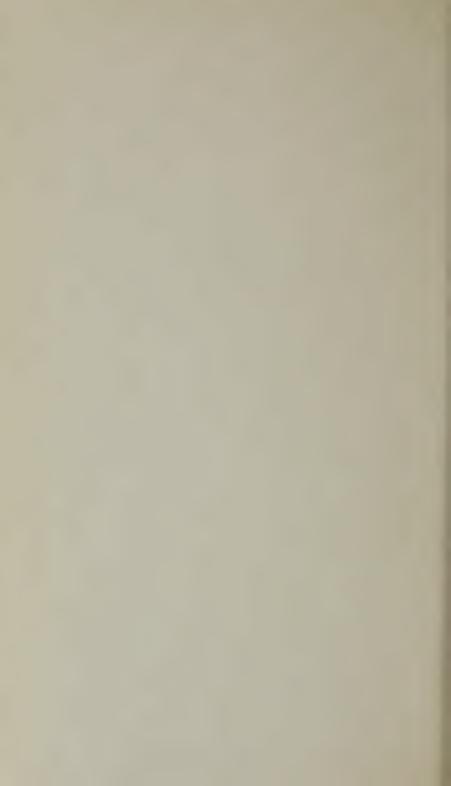
Belmont, citizens' meeting. State Grange meeting at Cummington. Warwick, Mount Grace meeting. Salisbury, citizens' meeting. Salem, Universalist Men's Club. Rowley, citizens' meeting. Newburyport, citizens' meeting. Merrimac, citizens' meeting. Manchester, public meeting. Haverhill, Order of Moose. Tree Wardens' Convention. Danvers, citizens' meeting. Haverhill, Universalist Club. Boxford Men's Club. Beverly, conservation committee. Haverhill, Order of American Mechanics. Amesbury, citizens' meeting. Stockbridge Men's Club. Public schools, Cambridge. Worcester County Extension School, Royalston. Hubbardston's Men's Club, Hubbardston. Daughters American Revolution, Natick. Hampden League Council, Brimfield. Hampden League Council, Montgomery.



An example of how indifferently roadside trees are cared for in some sections of the State. The lumberman has cut everything to the road on the right-hand side, and the few would-be trees have the heart taken out of them by the telephone poles and wires on the other side. Hundreds of instances may be seen of equal maltreatment of roadsides in the State due to lack of a uniform State-wide supervision and direction of effort.



The effect of white pine growth bordering a State highway. These trees are about one-half grown. They are beautiful in winter or summer, are not expensive to care for, and greatly increase the value of forest products for the section. The danger from forest fires is much less with pines, as the needles adhere more closely to the ground and are less combustible than deciduous leaves (Middleborough).



LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS. [Alphabetically by towns and cities.]

	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
157-W, Rockland,	Sumner L. Deane, .	Abington,	C. F. Shaw,	4
71-4, West Acton,	Wm. H. Kingsley, .	Acton,	J. O'Neil,	2
2003-M, New Bed-	Henry F. Taber, .	Acushnet,	A. P. R. Gilmore, .	13
ford. 201, Kippers, .	John Clancy,	Adams,	John Clancy,	5
6465-M, River, .	E. M. Hitchcock, .	Agawam,	E. M. Hitchcock, .	5
161-6, Great Bar-	W. F. Milligan,	Alford,		-
rington. 274-M,	Jas. E. Feltham, .	Amesbury,	A. L. Stover,	1
541-М,	A. F. Bardwell,	Amherst,	W. H. Smith,	5
324-М,	Chas. S. Buchan, .	Andover,	J. H. Playdon,	1
35 and 206,	Walter H. Pierce, .	Arlington,	Daniel M. Daley, .	1
	John T. Withington, .	Ashburnham, .	Charles H. Pratt, .	2
2-3,	W. S. Green,	Ashby,	Fred C. Allen,	2
3-5,	Ralph Tredick,	Ashfield,	Charles A. Smith, .	5
704-M and 199, .	H. H. Piper,	Ashland,	Theodore P. Hall, .	2
6 and 43-5,	Frank P. Hall,	Athol,	W. S. Penniman, .	5
\$4-R-4,	H. R. Packard,	Attleboro,	W. E. S. Smith,	13
5-12,	J. F. Searle,	Auburn,	B. F. Searle,	5
3259-М,	J. W. McCarty,	Avon,	W. W. Beals,	3
123-2,	D. C. Smith,	Ayer,	D. C. Smith,	2
141-2,	H. C. Bacon,	Barnstable, .	Robert Cross,	4
83-4,	A. E. Traver,	Barre,	James A. Dwinnell	5
8000 and 18, .	P. B. McCormick, .	Becket,		-
	Irving C. Waite,	Bedford,	W. A. Cutler,	2
	J. A. Peeso,	Belchertown, .	E. C. Howard,	5
8936-2, Milford, .	L. F. Thayer,	Bellingham, .	Lewis E. Whitney, .	3
409-W,	John F. Leonard, .	Belmont,	Martin Troy,	2
1367-М,	Gideon H. Babbitt, .	Berkley,	A. A. Briggs,	3
24-4,	E. Guy Sawyer,	Berlin,	E. C. Ross,	2
43-12,	Edson W. Hale,	Bernardston, .	Edwin D. Hale, .	5
20,	Robert H. Grant, .	Beverly,	Jas. W. Blackmer, .	1
	Mark E. Allen,	Billerica,	Fred L. Winship, .	2
9250,	John H. Dwyer, .	Blackstone, .	A. J. Duggan,	5
16-3,	I. E. Whitney,	Blandford,		-
9-3,	Albert I. Pardee, .	Bolton,	C. E. Mace,	. 2
		Boston,	Wm. P. Long,	1
38,	Walter E. R. Nye,	Bourne,	Edw. D. Nickerson, .	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
102-2, West Acton,	H. J. Livermore, .	Boxborough, .	C. E. Sherry,	2
19-25,	Clarence E. Brown, .	Boxford,	C. Perley,	1
4-4,	John N. Flagg,	Boylston,	Walter G. Brigham, .	5
433-R,	James M. Cutting, .	Braintree,	Clarence R. Bestick,	3
76-R-23,	T. B. Tubman,	Brewster,	Allison D. Rogers, .	4
281-3,	F. C. Worthen,	Bridgewater, .	F. C. Worthen,	4
18-2,	G. E. Hitchcock, .	Brimfield,	C. W. King,	5
	Wm. F. Daly,	Brockton,	Rufus H. Carr, .	4
109-13,	P. E. Gadaire,	Brookfield,	J. H. Conant,	5
	Geo. H. Johnson, .	Brookline,	Ernest B. Dane, .	1
	Gilbert E. Griswold, .	Buckland,		-
15-4,	Walter W. Skelton, .	Burlington, .	W. W. Skelton,	2
		Cambridge, .	J. F. Donnelly,	2
24-M and 21048, .	Ralph C. Crowell, .	Canton,	Wm. H. Gallivan, .	3
76-M, Concord, .	Geo. G. Wilkins,	Carlisle,	G. G. Wilkins,	2
16-2,	Herbert F. Atwood, .	Carver,	H. F. Atwood,	4
14-12,	Albert L. Veber, .	Charlement, .		-
42-2,	Edward A. Lamb, .	Charlton,	J. D. Fellows,	5
28-3,	Geo. W. Ryder,	Chatham,	Chas. R. Nickerson, .	4
1597-R,	Arnold C. Perham, .	Chelmsford, .	M. A. Bean,	2
		Chelsea,	J. A. O'Brien,	1
	S. W. Curtis,	Cheshire,		-
	Wm. H. Babb,	Chester,		_
4-2,	Chas. A. Bisbee,	Chesterfield, .		-
149-M and 149-W,	John E. Pomphret, .	Chicopee,	Edw. Bourbeau, .	5
	Robert W. Vincent, .	Chilmark,	A. S. Tilton,	4
352-24,	D. W. Blanchard, .	Clarksburg, .	F. E. Bishop,	5
312-W,	A. J. Robinson,	Clinton,	Peter R. Gibbons, .	2
260,	Wm. J. Brennock, .	Cohasset,	George Young,	4
23-2,	Frank A. Walden, .	Colrain,	Edgar F. Copeland, .	5
75-W,	Harry E. Tuttle, .	Concord,	H. P. Richardson, .	2
	Edgar Jones,	Conway,		-
	Thomas A. Gabb, .	Cummington, .		-
86-W,	S. L. Caesar,	Dalton,		-
	T. L. Thayer,	Dana,	T. L. Thayer,	5
417-M,	M. H. Barry,	Danvers,	T. E. Tinsley,	1
1658-5,	Chas. H. Mead,	Dartmouth, .	E. M. Munson,	3

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
35-R,	Henry J. Harrigan, .	Dedham,	J. T. Kennedy,	3
	Wm. L. Harris,	Deerfield,	Wm. S. Harris,	5
8118-4,	Chas. E. Pierce,	Dennis,	Joshua Crowell,	4
29-3,	Ralph Earle,	Dighton,	Albert N. Goff,	3
11-4,	W. L. Church,	Douglas,	F. J. Libby,	5
63-11,	John Breagy,	Dover,	H. L. MacKenzie,	3
	Frank H. Gunther, .	Dracut,	T. F. Carrick,	2
	Frank A. Putnam, .	Dudley,	Herbert J. Hill,	5
5-11, Tyngsbor-	Archie W. Swallow, .	Dunstable,	W. H. Savill,	2
ough. 82-2,	H. E. Merry,	Duxbury,	John D. Morrison, .	4
8110,	H. L. Belknap,	E. Bridgewater,	Lester W. Bourne, .	4
	Asher Markham, .	E. Longmeadow,	Herman W. King, .	5
24-3,	Adin L. Gill,	Eastham,	N. P. Clark,	4
306-12,	John M. Dineen, .	Easthampton, .	Chas. Kuhfuss, .	5
76 and 67,	Frederick Hanlon, .	Easton,	R. W. Melendy, .	3
241-2,	Manuel Swartz,	Edgartown, .	John P. Fuller,	4
165-25,	Frank W. Bradford, .	Egremont,		-
17-11,	H. A. Coolbeth,	Enfield,	H. C. Moore,	5
	C. H. Holmes,	Erving,	Chas. H. Holmes, .	5
	Otis O. Story,	Essex,	O. O. Story,	1
		Everett,	P. O. Sefton,	2
1686-Y,	C. F. Benson,	Fairhaven,	G. W. King,	3
822-W,	Wm. Stevenson,	Fall River,	Wm. Stevenson, .	3
136-2,	H. H. Lawrence, .	Falmouth,	W. W. Eldridge, Jr.,	4
745,	Page S. Bunker,	Fitchburg,	Dwight S. Woodworth,	2
9417-3, Hoosac Tunnel pay sta-	Horace B. Brown, .	Florida,		-
76 and 96-5, .	Ernest A. White, .	Foxborough, .	F. S. Richardson, .	3
352-4,	Bert P. Winch,	Framingham, .	N. I. Bowditch, .	2
66-12,	Edward S. Cook, .	Franklin,	J. W. Stobbart,	3
8-3,	A. M. Hathaway, .	Freetown,	G. M. Nichols,	3
161 and 191, .	Geo. S. Hodgman, .	Gardner,	T. W. Danforth, .	5
	L. B. Smalley,	Gay Head,	J. W. Belain,	4
71-12 and 8046-2,	Thos. C. Watson, .	Georgetown, .	Elwood T. Wildes, .	1
15-12, Bernards-	Lewis C. Munn,	Gill,	Chas. H. Whitaker, .	5
ton. 1380 and 1043, .	Geo. W. O'Maley, .	Gloucester, .	Geo. W. O'Maley, .	1
18-4,	John S. Mollison, .	Goshen,		-
	Harold S. Veeder, .	Gosnold,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
18-2,	Elmer E. Sibley, .	Grafton,	C. K. Despeau, .	5
	Geo. L. Murray, .	Granby,	George A. Harris, .	5
25,	Harry A. Root,	Granville,		-
327-W,	D. W. Flynn,	Gt. Barrington,	T. J. Kearin,	5
1185,	J. W. Bragg,	Greenfield,	J. W. Bragg,	5
33-24, Enfield, .	W. H. Walker,	Greenwich, .	B. A. Sawtelle,	5
71-5,	C. M. Raddin,	Groton,	Herbert W. Taylor, .	2
2939-М,	S. E. Johnson,	Groveland,	R. D. Larive,	1
651-33,	E. P. West,	Hadley,	Leroy C. Sabin,	5
5-2,	Wm. L. Robertson, .	Halifax,	F. D. Lyon,	4
	Fred Berry,	Hamilton,	E. G. Brewer,	1
5-14,	Edward P. Lyons, .	Hampden,		-
17-F-2,	Charles Tucker,	Hancock,		_
51-5, Rockland, .	Chas. E. Damon, .	Hanover,	L. Russell,	4
12-23,	Geo. T. Moore,	Hanson,	George T. Moore,	4
3-12,	George Fay,	Hardwick,	George J. Fay,	5
46-3,	Benjamin J. Priest, .	Harvard,	G. C. Maynard,	2
103-3,	John Condon,	Harwich,	Arthur F. Cahoon, .	4
72-4,	Fred T. Bardwell, .	Hatfield,	Seth W. Kingsley,	5
	John B. Gordon, .	Haverhill,	M. J. Fitzgerald, .	1
17-7,	Herbert A. Holden, .	Hawley,		-
5-18,	S. G. Benson,	Heath,		_
500,	George Cushing, .	Hingham,	T. L. Murphy,	4
7-12,	A. N. Warren,	Hinsdale,		_
130-R, Randolph,	Melvin L. Coulter, .	Holbrook,	Bradford Parks, .	3
42-4,	Winfred H. Stearns, .	Holden,	W. H. Stearns,	5
5-21, Brimfield, .	Oliver L. Howlett, .	Holland,	W. A. Morse,	5
113,	W. A. Collins,	Holliston,	Herbert E. Jones, .	2
1167-W,	C. J. Haley,	Holyoke,	T. A. Bray,	5
248-W,	S. E. Kellogg,	Hopedale,	C. E. Nutting,	5
19,	George W. Smith, .	Hopkinton, .	W. A. MacMillan, .	5
35-11,	W. L. Lovewell,	Hubbardston, .	Ralph W. Hartwell, .	5
24,	M. P. Mitchell,	Hudson,	George A. Coolidge,	2
		Hull,	J. Knowles,	4
4-11,	John J. Kirby,	Huntington, .		
74-R,	Arthur H. Walton, .	Ipswich,	J. A. Morey,	1
	Dr. A. B. Holmes, .	Kingston,	Chas. H. Childs, .	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
261-W, · ·	N. F. Washburn, .	Lakeville,	N. F. Washburn, .	4
	Arthur W. Blood, .	Lancaster,	L. R. Griswold, .	2
1295-24,	King D. Keeler,	Lanesborough, .	George H. Judivine, .	5
362,	D. E. Carey,	Lawrence,	John A. Flanagan, .	1
66-M,	James W. Bossidy, .	Lee,		-
37-5,	B. H. Fogwell,	Leicester,	J. H. Woodhead, .	5
	Oscar R. Hutchinson,	Lenox,	T. Francis Mackey, .	5
28, 29 and 546, .	F. A. Russell,	Leominster, .	D. E. Bassett,	2
	Mellen H. Briggs, .	Leverett,	I. H. Taylor,	5
1104-R,	Osborne J. Gorman, .	Lexington,	O. J. Gorman,	2
274-41, Greenfield,	Jacob Sauter,	Leyden,	Jacob Sauter,	5
44-W,	John J. Kelliher, .	Lincoln,	J. J. Kelliher,	2
17-4	A. E. Hopkins,	Littleton,	A. E. Hopkins,	2
	Oscar C. Pomeroy,	Longmeadow, .		-
3400,	Edw. F. Saunders, .	Lowell,	J. G. Gordon,	2
1-12.	H. A. Munsing,	Ludlow,	Ashley N. Bucher, .	5
20	J. S. Gilchrest,	Lunenburg, .	James S. Gilchrest, .	2
1174 and 3015,	George A. Cornet,	Lynn,	Arthur W. Lewis, .	1
9-3,	Lewis F. Pope,	Lynnfield,	L. H. Twiss,	1
	Watson B. Gould, .	Malden,	W. B. Gould,	2
319-W,	Peter A. Sheahan.	Manchester, .	P. A. Sheahan,	1
1-R and 281-W, .	Herbert E. King.	Mansfield,	E. Jasper Fisher, .	3
	John T. Adams,	Marblehead, .	W. J. Stevens,	1
117-2,	George B. Nye,	Marion,	J. Allenach,	4
	Edward C. Minehan, .	Marlborough, .	M. E. Lyons,	2
43-3,	W. G. Ford,	Marshfield,	P. R. Livermore, .	4
31-2, Cotuit, .	Darius Coombs	Mashpee,	S. Henry Peters, .	4
13-3,	Frank Tinkham, .	Mattapoisett, .	Frank A. Tinkham, .	4
	Geo. H. Gutteredge, .	Maynard,	A. Coughlin,	2
119-4, ,	William E. Bell,	Medfield,	G. L. L. Allen, .	3
	Chas, E. Bacon,	Medford,	Hugh G. Kennedy, .	2
6-2	John B. Durfee,	Medway,	F. Hager,	3
		Melrose,	J. J. McCullough,	2
188-M	F. M. Aldrich,	Mendon,	F. M. Aldrich, .	5
85,	Chas. E. Hoyt,	Merrimac,	C. R. Ford,	1
2747,	W. M. Freeman,	Methuen,	A. H. Wagland,	1
232-W	W. H. Connor,	Middleborough,	John J. Fowler,	4
	The Common of th			

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

	1			
Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div No.
8000,	G. E. Cook,	Middlefield, .		-
63-25 and 63-14, .	L. G. Esty,	Middleton,	B. T. McGlauflin, .	1
37-М,	E. J. Burke,	Milford,	P. F. Fitzgerald, .	5
152-2,	Harry L. Snelling, .	Millbury,	E. F. Roach,	5
5-2,	Charles LaCroix, .	Millis,	Everett Caldwell, .	13
1442-25,	Ralph S. Carpenter, .	Milton,	Ralph S. Carpenter, .	8
1149-J-1,	Robert McLaughlin, .	Millville,	Robert McLaughlin, .	5
8-22, Readsboro,	Huel S. Tower,	Monroe,		-
V t. 12-22,	O. E. Bradway,	Monson,	Robt. S. Fay,	5
14-4,	Thomas Berard,	Montague,	F. H. Gillette,	5
164-25,	Jasper H. Bills,	Monterey,		-
3-24,	A. J. Hall,	Montgomery, .		-
17-6,	Howard Porter,	Mt. Washington,		_
		Nahant,	T. Roland,	1
16-3,	E. W. Francis,	Nantucket, .	George M. Winslow, .	4
	Wm. H. Connelly,	Natick,	S. H. Hunnewell,	2
195-W,	H. H. Upham,	Needham,	E. E. Riley,	3
	Chas. S. Baker	New Ashford, .		_
	Edward F. Dahill,	New Bedford, .	C. F. Lawton, .	3
6-4. Gilbertville,	Frank A. Morse,	New Braintree,	E. L. Havens,	5
8005-2,	E. M. Stanton,	New Marlbor-		_
10, Cooleyville, .	Sewall V. King,	ough. New Salem,	Sewall V. King, .	5
1112-5,	Wm. P. Bailey,	Newbury,	Percy Oliver,	1
380	Chas. P. Kelley,	Newburyport, .	C. P. Kelley,	1
30, Newton South,	W. B. Randlett,	Newton,	W. W. Colton, .	2
129-4, Franklin,	Lester J. Murphy,	Norfolk,	James T. Buckley,	3
205-W	H. J. Montgomery,	North Adams, .	Jackson L. Temple,	5
1029-J,	Wm. L. Smith,	No. Andover,	Wm. L. Smith,	1
	H. W. Tufts,	North Attlebor-	F. P. Toner.	3
63-4,	Oscar C. Hirbour,	ough. North Brookfield,	S. D. Colburn, .	5
49.	C Ti Ti-t	North Reading,	G. E. Eaton,	2
165,	TP TP CI	Northampton, .	Chas. A. Maynard,	5
12-11,	CI	Northborough, .	Lewis H. Smith,	5
71-5 and 182.	W E D	Northbridge, .	A. F. Whitin,	5
114-2,	F. W. Doane,	Northfield,	F. W. Doane,	5
29-11.	Geo. H. Storer,	Norton,	G. H. Storer,	3
7-12,				4
1-12,	J. H. Sparrell,	Norwell,	J. H. Sparrell,	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
417-M,	F. W. Talbot,	Norwood,	C. A. Bingham, .	3
119-4,	Harold W. Chase, .	Oak Bluffs, .	Frank F. Blanken-	4
17-5,	C. H. Trowbridge, .	Oakham,	c. H. Trowbridge, .	5
232-12,	Wm. Walsh,	Orange,	Jas. W. Cooper, .	5
33-2,	James Boland,	Orleans,	A. Smith,	4
	Durand A. Witter, .	Otis,		-
9-5,	Olin D. Vickers, .	Oxford,	C. G. Larned,	5
53-3 and 53-12, .	James Summers, .	Palmer,	C. H. Keith,	5
	F. L. Durgin,	Paxton,	F. L. Durgin,	5
	John J. Callahan, .	Peabody,	J. J. Callahan,	1
59-R and 59-W,	John Hubbard,	Pelham,	Marion E. Richard-	5
Amherst. 83-3, Bryantville,	Joseph J. Shepherd, .	Pembroke,	Wm. C. Jones,	4
8029-2, Bryant- ville, 8007-13,			,	
Hanover. 23-21,	G. M. Palmer,	Pepperell,	J. Tune,	2 -
11-2, Hinsdale,	Arthur Kilbourne, .	Peru,		-
61,	George Marsh,	Petersham,	Daniel Broderick, .	5
228-Y, Athol, .	Wm. H. Cowlbeck, .	Phillipston, .	W. H. Cowlbeck, .	5
834 and 535-M, .	Chas. L. Klein,	Pittsfield,		-
33-11,	F. J. Butler,	Plainfield,		-
	Henry F. Boerger, .	Plainville,	George H. Snell, .	3
264,	Ira C. Ward,	Plymouth,	A. A. Raymond, .	4
13-7, Kingston, .	David L. Bricknell, .	Plympton, : .	D. L. Bricknell, .	4
19-4, Cooleyville,	Fred W. Doubleday, .	Prescott,	C. M. Pierce,	5
13-4,	Fred W. Bryant, .	Princeton,	F. A. Skinner,	5
49-11,	J. H. Barnett,	Provincetown, .	J. M. Burch,	4
1,	Faxon T. Billings, .	Quincy,	A. J. Stewart,	3
279,	R. F. Forrest,	Randolph,	John T. Moore,	3
1161-W,	E. E. Chickering, .	Raynham,	G. M. Leach,	3
518-W,	H. E. McIntire,	Reading,	H. M. Donegan, .	2
11-12,	B. F. Munroe,	Rehoboth,	R. E. Anderson, .	3
		Revere,	G. P. Babson,	1
8-2,	Timothy B. Salmon, .	Richmond,		-
12-32,	Daniel E. Hartley, .	Rochester,	Samuel H. Corse, .	4
55-X,	John H. Burke,	Rockland,	F. H. Shaw,	- 14
14-4,	John C. Martin,	Rockport,	F. A. Babcock,	1
21-6,	M. A. Peck,	Rowe,		-
3-13,	Daniel O'Brien,	Rowley,	Chas. Curtis,	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
279-2,	L. G. Forbes,	Royalston,	P. F. Richards, .	5
2-12,	S. S. Shurtleff,	Russell,		-
4-12,	Henry Converse, .	Rutland,	H. E. Wheeler,	5
		Salem,	Warren F. Hale, .	1
	James H. Pike,	Salisbury,	H. C. Rich,	1
202-3,	C. D. Strickland, .	Sandisfield, .		_
43-2,	J. R. Holway,	Sandwich,	B. F. Dennison, .	4
	Thos. E. Berrett, .	Saugus,	T. E. Berrett,	1
4-16,	C. E. Tilton,	Savoy,		-
129-3,	E. R. Seaverns,	Scituate,	Wm. F. Ford,	4
462-J-2, Paw-	John L. Baker,	Seekonk,	C. A. Smith,	3
tucket.	W. C. Morse,	Sharon,	J. J. Geissler,	3
26,	A. H. Tuttle,	Sheffield,		-
130-2,	Chas. F. Dole,	Shelburne,	Chas. F. Dole,	5
	Milo F. Campbell, .	Sherborn,	Geo. W. Rock,	2
	Asa A. Adams,	Shirley,	A. A. Adams,	2
- , -	E. A. Logan,	Shrewsbury, .	Robt. C. Clark, .	5
2-14, Cooleyville,	Nathan J. Hunting, .	Shutesbury, .	Clarence A. Haskell,	5
2632-M,	Wm. F. Griffiths, .	Somerset,	C. Riley,	3
		Somerville,	A. B. Prichard, .	2
22,	L. H. Lamb,	So. Hadley, .	Louis H. Lamb, .	5
151-23,	C. S. Olds,	Southampton, .	C. S. Olds,	5
13, Marlborough,	Harry Burnett,	Southborough, .	H. Burnett,	5
3505 Fort Hill.	Aimee Langevin, .	Southbridge, .	J. Langevin,	5
35-3,	B. M. Hastings,	Southwick, .		-
77-3,	A. F. Howlett,	Spencer,	G. Ramer,	5
20,	C. S. Taylor,	Springfield, .	J. Alden Davis, .	5
5-12,	J. T. Wilder,	Sterling,	J. H. Kilburn,	2
53-М,	Geo. Schneyer,	Stockbridge, .	George Schneyer, .	5
176-12,	Albert J. Smith, .	Stoneham,	G. M. Jefts,	2
276-2 and 121-3, .	Fred H. Pye,	Stoughton, .	W. P. Kennedy, .	3
	Wm. H. Parker,	Stow,	H. W. Herrick,	2
6-1,	C. M. Clark,	Sturbridge, .	C. M. Clark,	5
	Seneca W. Hall,	Sudbury,	W. E. Baldwin, .	2
46,	A. C. Warner,	Sunderland, .	Richard Graves, .	5
58-32,	R. H. Richardson, .	Sutton,	R. H. Richardson, .	5
1911-J, 🤏	Everett P. Mudge, .	Swampscott, .	E. P. Mudge,	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
468-W,	Thos. L. Mason,	Swansea,	A. E. Arnold,	3
1-320,	Fred A. Leonard, .	Taunton,	L. W. Hodgkins, .	3
78-2, 78-3 and 30,	C. A. Fletcher,	Templeton, .	J. B. Wheeler,	5
4249-J,	Harris M. Briggs, .	Tewksbury, .	H. M. Briggs,	2
102-3 and 161-4, .	Elmer C. Chadwick, .	Tisbury,	H. W. McLellan, .	2
269-5, Winsted,	Rupert E. Clark, .	Tolland,		-
Conn.	T. Jesse Fuller,	Topsfield,	Harland S. Peirce, .	1
70 and 51-2, .	F. J. Piper,	Townsend,	G. E. King,	2
	Walter F. Rich,	Truro,	J. H. Atwood,	18
1,	Otis L. Wright,	Tyngsborough, .	C. J. Allgrove,	2
3-6,	Clifford R. Canon, .	Tyringham, .		-
8000 and 15-2, .	Geo. L. Williams, .	Upton,	Clarence L. Goodrich,	5
101,	H. W. Phoenix,	Umbridge,	Willard Holbrook, .	5
58 and 455-M, .	W. E. Cade,	Wakefield,	W. W. Whittredge, .	2
9-11 and 9-23,	L. H. Thompson, .	Wales,	M. C. Royce,	5
Brimfield.	Jas. J. Hennessey, .	Walpole,	Philip R. Allen, .	3
6,	Geo. L. Johnson,	Waltham,	W. M. Ryan,	2
117-13,	Joseph Dupre,	Ware,	F. Leissig,	5
45-23,	Delbert C. Keyes, .	Wareham,	J. J. Walsh,	4
	Timothy M. Collins, .	Warren,	Alex A. Gendron, .	5
	C. A. Williams,	Warwick,	Chas. Bass,	5
12-4, Becket, .	Lester G. Heath, .	Washington, .		-
	John C. Ford,	Watertown, .	Van D. Horton, .	2
31-3, Wayland, .	Howard C. Haynes, .	Wayland,	D. J. Graham,	2
101-R,	E. L. Wallis,	Webster,	C. Klebart,	5
9 and 724-M, .	John P. Doyle,	Wellesley,	George Goodyear, .	3
	John Holbrook,	Wellfleet,	Wm. H. Gill,	4
6-23,	Chas. A. Fiske,	Wendell,	G. E. Mills,	5
	Jacob D. Barnes, .	Wenham,	J. E. Kavanagh, .	1
8-23,	Arthur J. Hunting, .	W. Boylston, .	Harry E. Lowe, .	5
	Warren P. Laughton, .	W. Bridgewater,	O. Belmore,	4
114-3, No. Brook-	John H. Webb,	W. Brookfield, .	J. H. Webb,	5
field.	Louis H. Flook,	W. Newbury, .	Frank E. Bailey, .	1
6961-J and 1504, .	E. B. Jones,	W. Springfield, .	George W. Haven, .	5
8010,	B. P. Bissell,	W. Stockbridge, .		-
92-3,	Wm. J. Rotch,	W. Tisbury, .	H. M. Athearn,	4
119-3,	Thos. Humphrey, .	Westborough, .	George Haven,	5
				1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div.
111-Y and 111-W,	Thos. H. Mahoney, .	Westfield,		-
14-11,	H. L. Nesmith,	Westford,	H. L. Nesmith,	2
148-14,	Clayton A. Bartlett, .	Westhampton, .		-
1-3, . , .	W. F. Neal,	Westminster, .	G. A. Sargent,	5
	B. R. Parker,	Weston,	E. P. Ripley,	2
11-21,	Frank Whalon,	Westport,	H. A. Sanford,	3
	Elmer E. Smith, .	Westwood,	Martin Sorenson, .	3
185-M and 21689,	Walter W. Pratt, .	Weymouth, .	C. L. Merritt,	3
39-14,	John H. Pease,	Whately,	Rylan C. Howes, .	5
349-W,	C. A. Randall,	Whitman,	C. A. Randall,	4
1-4,	Henry I. Edson, .	Wilbraham, .	Henry I. Edson, .	5
	John L. Brown,	Williamsburg, .		-
84-W,	W. H. Davies,	Williamstown, .	William Davies, .	5
28-2,	Oliver McGrane, .	Wilmington, .	Oliver McGrane, .	2
196-3,	Wm. F. Clark,	Winchendon, .	Joseph W. Crocket, .	5
	David DeCourcy, .	Winchester, .	S. S. Symmes,	2
	Amos S. Ferry,	Windsor,		_
		Winthrop,	Fred A. Whittemore,	1
	Frank E. Tracy, .	Woburn,	H. V. Macksey, .	2
7137, Park,	Wesley N. Avery, .	Worcester,	H. J. Neale,	5
10-22,	Chas. A. Kilbourn, .	Worthington, .		_
39,	Geo. H. E. Mayshaw,	Wrentham,	H. Gilmore,	3
8-31, Barnstable,	Joseph W. Hamblin, .	Yarmouth,	C. R. Bassett,	4

REMARKS.

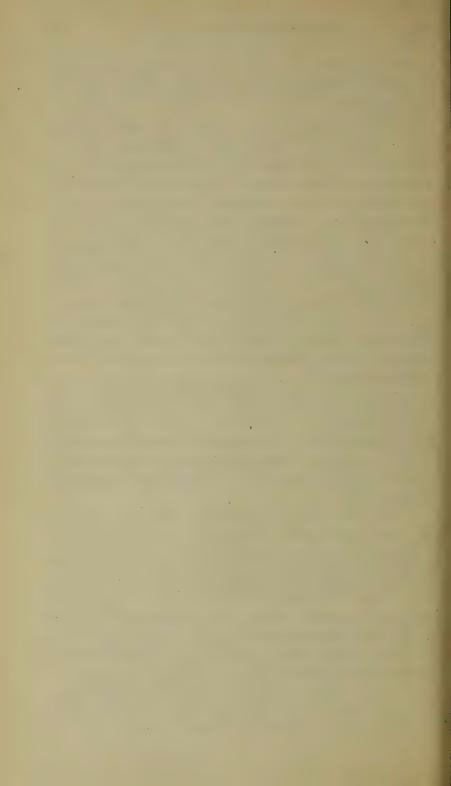
- 1. Realizing that it is the patriotic duty of the department to be as economical as possible, the State Forester is making no new or specific recommendations and asking for no new legislation this year.
- 2. The efforts of the department to assist in the production of wood for fuel and its economic distribution and more common use will be given due consideration the coming year.
- 3. With our present high prices for spraying materials, tools, equipment and labor our appropriation for moth work will go only two-thirds as far as under normal conditions; hence the necessity for greater efficiency. Arsenate of lead costs over 3

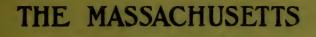
cents a pound more than last year, and three times as much as it did four years ago. The rise in price will mean an extra expense of nearly \$40,000 for this insecticide alone over last year's prices.

- 4. We have a large supply of stock in the State nurseries, and in order to keep up the interest in reforestation, and that individuals may take advantage of this opportunity to plant waste lands, the State Forester is authorized by the Governor and Council to sell to any person who will plant them in Massachusetts, pine transplants (small trees three to four years old) for \$7, a thousand, packed and ready for shipment. The number allowed is not less than 1,000 or more than 10,000 to a person. Send orders to the State Forester, State House, Boston, Mass.
- 5. The redistricting of the moth work according to county lines will aid us in our co-operative work with the county agricultural agents and forest fire division men who have similar districts. Mutual assistance and understanding greatly aids in accomplishing results.
- 6. Were it not for the abnormal conditions existing because of the war, as referred to in that portion of this report dealing with State forests, I should make a specific recommendation that sufficient funds be appropriated to enable the planting of at least 1,000 acres of State-owned lands the coming year. As it is, I leave to the wisdom of the General Court the expediency of such action.
- 7. The State Forester's Department stands ready to advise and assist Massachusetts citizens in the proper development of their woodlands. It is to be hoped that in our enthusiasm to produce wood fuel at present high prices, we may not slaughter trees that rightfully should be retained for our future industries. There are plenty of woodlands in all sections of the State that are really in great need of improvement thinning. All the cordwood necessary can be derived by practicing modern economic methods, and the results will be along the line of conservation of the right kind.

F. W. RANE,

State Forester.





STATE FORESTER

FRANK W. RANE

PUBLIC DOCUMENT
No. 73

FIFTEENTH ANNUAL REPORT 1918



THE

STATE FORESTER

OF

MASSACHUSETTS

FIFTEENTH ANNUAL REPORT 1918

F. W. RANE, STATE FORESTER



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Mere Officials

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

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The Commonwealth of Massachusetts.

FIFTEENTH ANNUAL REPORT OF THE STATE FORESTER.

To the General Court.

It has been our aim and our desire to make this report as concise as possible. In conformity with the act of last year, it is stripped of all the fullness of detail which has characterized former reports submitted by this department, and contains only a brief summary of the year's work, together with such recommendations and suggestions as we believe may well engage the serious attention of the General Court. We are confident that forestry has not only come to stay in Massachusetts, but is bound to become an increasingly important factor in developing and sustaining the economic strength of our Commonwealth.

The history of forestry developments, activities and achievements yields "comfort and good cheer" to those who recognize the importance of making provision for an adequate supply of timber in the future. While the progress we have thus far attained is challenging attention, we believe we can ill afford to further postpone the policy of planting and managing on a much larger scale than has thus far obtained.

There is an added incentive to the enlargement of this enterprise at this time. With the close of the World War we find ourselves confronted by problems that are already engaging the serious attention of the greatest minds in the public life of the nation, and the question most frequently discussed, and the one the finding of a correct answer for which is of the most vital importance to us as a people, is how to reabsorb into our social and industrial life that vast army of

young Americans who have been fighting to make the world a decent place to live in. In the immediate future thousands of these boys will be seeking employment, and it should be our duty to see to it that every agency which may be advantageously employed should be used to meet the situation.

The State Forester has now under his control more than 15,000 acres of land which have been purchased by the State Forest Commission and turned over to him for reforestation and management. He also has in the forest nurseries a sufficient number of trees to plant thousands of acres of these lands. I therefore desire to urge upon the General Court the wisdom of making an appropriation sufficient to begin the work of developing these State forests. Such action by the General Court will enable this department to furnish healthy occupation to many of these men whose welfare should be our greatest concern, at the same time carrying out the policy, to which the State is committed, of establishing splendid State forests.

The discovery a few years ago of the white pine blister rust, and the prominence given it by the press and through other mediums, caused considerable anxiety on the part of those interested in the promotion of forestry, many being made to believe that the planting of white pine would have to be discontinued. The investigations undertaken and prosecuted with great vigor by the Federal government, supplemented by the efforts of many of the States, have finally resulted in our obtaining a fairly definite knowledge of how widespread the disease is, and a more comprehensive idea of how best to control it.

At its meeting held at the State House on November 11 and 12, the North American Committee, made up of representatives from a dozen or more leading States and Canada, after discussing the subject nearly two days, adopted a resolution which declared in substance that while the disease should be considered dangerous, and that remedial measures should be adopted, it is not sufficiently menacing to stop the planting of white pine. In Massachusetts the responsibility of controlling this disease by statute rests upon the Department of Agriculture, the State Forester co-operating.

During the year the gypsy moth work has been continued with unabated energy and with encouraging results. Notwithstanding the difficulty in securing competent labor, and the advanced prices of materials used in connection with this work, we succeeded in making satisfactory progress. In the prosecution of this work during the past year especial attention was given to woodland thinning operations. As is well known, our Massachusetts woodlands are commonly a mass of crowded. choked growth, with many more trees struggling for existence than can under such conditions reach maturity. Also, owing to the depredations of the gypsy moth, many trees are found dead or in a dying condition. A judicious thinning of such forests is not only beneficial to the remaining trees by giving them more freedom of growth, but also makes spraying operations and other methods commonly employed in moth suppression more easy to be carried on.

With the coal shortage the demand for wood for fuel was very great, and prices at once became very high. To get wood fuel at any price seemed to be the idea. It was not only a question of the domestic supply, but factories working on war contracts had to resort to wood fuel in many cases.

It was impossible to direct the wood-cutting operations as heretofore, although there were plenty of woodlands needing judicious thinning. Wood for fuel was wanted immediately, and the price proved alluring to owners, and much wood was cut, regardless of future results.

Some good work, however, was done, but as labor was in great demand, and capital was almost impossible to get, as the production of food seemed to command it, no very effective and far-reaching policy could be established.

During the present season a greater amount of constructive work has been possible. The fact that dependence could be placed upon wood fuel to help out strained fuel conditions has caused people to lay in an auxiliary supply. Also, the better prices have interested woodland owners in cutting more wood for the market, and particularly in making improvement cuttings.

This department has encouraged towns and cities to purchase portable wood-sawing machinery, which is being used quite

commonly in many sections of the State. In Middlesex County probably the largest number of portable wood-sawing machines are at work this winter. These machines cut the wood into 12-inch, 16-inch and 2-foot lengths, which are the usable sizes. Thus far, wherever wood in these sizes is to be had, the demand exceeds the supply. Four-foot wood, while it is the standard unit in dealing with wood fuel, nevertheless is not the size that consumers desire for domestic use, and it is believed it will pay us to go one step further and cut our wood into the smaller sizes if we expect to continue to find the desired markets for our products. For brick factories, manufacturing concerns, etc., who can use the 4-foot lengths, of course that size may continue to be the standard unit.

By cutting into the smaller lengths, also, almost everything can be used, hence there is very little waste.

One of the great needs, however, in dealing in short wood is some standard legal measures for wood to be sold in entire contents or so-called bulk-thrown wood. While a cord of wood is designated as 4 feet high, 4 feet wide and 8 feet long, or 128 cubic feet, when this same cord is cut into shorter lengths and then piled, it invariably shrinks in measurement, as it packs more closely than when in the longer lengths. This department has made some careful measurements, and is prepared to submit the data for establishing a definite law covering this point. The Sealer of Weights and Measures is co-operating in this work.

If from our past experience we may be able to encourage a better and more economic use of fuel wood at reasonable prices, it is believed we shall have taken the proper step toward getting forestry established on a far more successful basis. Fuel wood is a by-product of the forest, but it has real potential value, and with better methods of distribution and utilization a permanent solution of the problem will be reached.

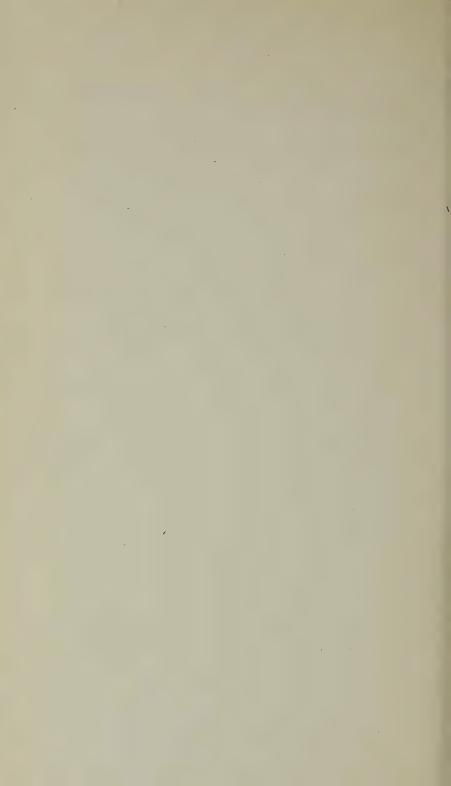
The invasion of the cranberry bogs in Plymouth and Barnstable counties by the gypsy moth has been referred to in previous reports. The importance of protecting this great industry from the peril of this pest was quickly recognized, and prompt action taken. This department, working in co-opera-



A wood-sawing machine, equipped with an endless chain carrier, which piles the wood at a convenient distance from the machine. The machine in the left center is a splitter. A 10 horse-power kerosene engine is the source of power. One of the experimental machines being used by the State Forester's department in the town of Dover.



The type of woodlands that the State Forester is encouraging owners to operate for use on the present market. A thousand cords were cut out of this moth-depleted stand last winter. Only the better trees were left, and at the present time these trees are retaining their foliage in spite of the gypsy moth. The photograph shows the committee of agriculture of the General Court on an inspection trip.



tion with a committee of the Cape Cod Cranberry Growers' Association, has been diligently engaged in carrying on operations of a protective nature. This work has consisted mainly in removing the tree growth from the land immediately adjacent to the bogs, thereby reducing in large measure the possibility of infestation. While the work thus far accomplished is encouraging, it is felt that still greater efforts will be required before the pest in this region is brought under complete control.

It is the purpose of the State Forester to give this protective work the closest attention, and while it would be difficult indeed to predict what may be the net result of our co-operative effort to protect the cranberry industry from the ravages of the gypsy moth, all things considered, if this salvage work be even 50 per cent. efficient, we shall certainly not have labored in vain.

That the situation is regarded as serious by the cranberry growers themselves is evidenced by the following report of their committee just submitted to the State Forester.

REPORT OF CRANBERRY COMMITTEE ON MOTH WORK.

The Infestation of Cranberry Bogs by Gypsy Moths.

The committee have made a more careful inspection than has been heretofore done. Some ten weeks have been spent on the work, and we find the infestation covers to some extent the whole cranberry industry.

We would call attention to the towns of Rochester and Plymouth and the lower cape towns of Barnstable, Mashpee, Harwich, Dennis and Brewster, where the most damage has been done.

There are bogs badly injured at the present time that will take some years to recover. The peculiar situation of some bogs, being surrounded by hills covered with a growth of oak, will be very hard to handle.

From every viewpoint bog infestation will be very heavy for some time to come, and the situation, as viewed by us, is very serious and will take the co-operation of the State, towns and growers to save the cranberry industry from the gypsy moth pest.

J. M. Bump, Chairman.
James J. Walsh,
C. A. Driscoll.
John W. Churchill.
I. C. Hammond.
Walter F. Holmes.

The prevention of forest fires continues to be one of the most serious problems with which the department is obliged to contend. Past experience makes it clear that to deal more effectively with this evil more stringent rules and regulations governing the disposal of slash or brush must be adopted. The State Fire Warden has given the subject the most rigid investigation, and as will be noted in his report to the State Forester he recommends remedial measures.

ORGANIZATION.

There have been many changes in our department during the year, owing particularly to the war. The changes have been mostly among our foremen and observers. We print here our honor roll of enlisted and drafted men.

HONOR ROLL.

Charles R. Atwood,			20th Engineers.
Lester W. Bryan, .		, .	20th Engineers.
Clifford N. Churbuck,			Aviation Corps.
Earl Flebut,			101st Engineers.
William LaPoint, .			Ambulance Corps.
Guy W. Lucas, .			Camp Devens,
Frank G. Michelson,			Infantry.
Charles Palmer, .			Coast Artillery.
William E. Palmer,			Engineers.
Joseph L. Peabody,			20th Engineers.
Burr Powers, .			Quartermaster's Corps.
Frederick R. Stone,			Infantry.
Arthur Stuart, .			Infantry.
Thornton G. Taylor,			S. A. T. C., Massachusetts Agri-
			cultural College.
John E. Wheeler, .			F. A. C. O. T. S., Camp Zachary
			Taylor.
Ainsley C. White,			United States Navy.
Raymond T. Wilder,			20th Engineers.

The present organization of the department is as follows: —

. . . United States Navy.

GENERAL STAFF.

F. W. RANE, B.Agr., M.Sc.,		State Forester
C. O. BAILEY,		Secretary.
ELIZABETH HUBBARD, .		Bookkeeper.
ELIZABETH T. HARRAGHY,		Stenographer.
JENNIE D. KENYON, .		Stenographer.
MABEL R. HAMNETT, .		Clerk.

Raymond J. Zilch,

GENERAL FORESTRY.

H. O. Cook, M.F.,			Assistant forester in charge.
J. R. SIMMONS, B.Sc.,			Reforestation work.

JAMES MORRIS, Assistant.

Three Sames Superintendent Rorns

EBEN SMITH, Superintendent, Barnstable Nursery.

J. A. Palmer, Superintendent, Amherst Nursery.

H. H. CHASE, . . . Field foreman.
FRED W. PARKER, . . . Field foreman.
JOHN H. SAXTON, . . . Field foreman.
AVERY GARDNER, . . . Field foreman.

Moth Work.

GEORGE A. SMITH, Assistant (equipment, accounts, etc.).

PAUL D. KNEELAND, M.F., . . . Assistant (woodlands, products, etc.).

GUY W. LUCAS, B.Sc., . . , Assistant. HERBERT E. HENSHAW, . . . Assistant.

District Moth Men.

1. SAUL PHILLIPS, Beverly.

2. Wm. A. HATCH, Marlborough.

3. C. W. PARKHURST, Foxborough.

- 4. W. F. Holmes, Wareham.
- 5. Harry B. Ramsey, Worcester.

FOREST FIRE PREVENTION.

Staff.

M. C. HUTCHINS, State Fire Warden.

JOSEPHA L. GALLAGHER, . . . Clerk.

District Forest Wardens.

- 1. Jos. J. Shepherd, Pembroke.
- 2. MINER E. FENN, Needham.
- 3. JAMES E. MOLOY, Woburn.
- 4. John P. Crowe, Westborough.
- 5. Albert R. Ordway, Westfield.

FREDERICK W. OLIVER, Georgetown.

Observers.

JOHN CONDON, North Harwich.
JOSEPH JENKINS, Barnstable.
W. I. MOODY, West Falmouth.
WALTON F. RAYMOND, BOUTNEDAIL.
F. L. BUCKINGHAM, Kingston.
D. M. SMITH, Waltham.
S. EDWARD MATTHEWS, Middleborough.
JOHN H. MONTLE, Fall River.
EVERETT SHORT, Rehoboth.
CHAS. F. KINGALY, HOPEON.

CHAS. F. KIMBALL, Hanson. EDWARD D. SPRAGUE, Hingham.

Edward D. Sprague, Hingham. C. H. Baker, Sharon.

Mrs. Allen Keniston, Martha's Vineyard.

F. R. STONE, Sudbury.

JOHN H. O'DONNELL, Wakefield.

C. E. Blood, Chelmsford.

THOMAS MAGOVERN, Charlton.

CAPLIS McCormick, Manchester. JOHN G. PURINGTON, Mendon. JOHN ROCHE, Westborough. JAMES MALEY, Princeton. WM. E. TAYLOR, Warwick. K. W. Burrows, Pelham. GEORGE B. SHERMAN, Brimfield. CHARLES PUTNAM, Westfield. N. C. WOODWARD, Shelburne Falls. H. H. FITZROY, Savoy. ELMER HUNT, Chester. JOHN E. CURTIN, Tolland. CLAYTON BUNT, Great Barrington. ROBERT MILLER, Pittsfield. HARRY GEORGE, Williamstown. GEORGE E. WALKER, Ashby.

ALTON B. ELLIS, Acushnet.

GENERAL FORESTRY.

The activities of this branch of the State Forester's department are pretty thoroughly covered in the following tables, but it is of interest to call attention to certain parts of the data there presented.

On account of the shortage of labor, especially because of the loss of trained foremen who enlisted in the service, less work than usual was done on the reforestation lots and the State forests. We have, however, planted 10 new plantations and finished reforesting 2 others which were uncompleted in previous years, a total acreage of about 300, requiring the use of 200,000 trees. At the same time we carried on the maintenance work of brush-cutting and replanting on 11 other lots, cutting brush on 100 acres and planting 57,000 trees.

In spite of the labor conditions our nursery work was carried on to its normal capacity. In fact, at the Bridgewater State Farm, where we are accustomed to use the labor of inmates, the shortage of this class of labor was so great that we could not obtain any, and we were obliged to hire outside help to carry on the nursery. We had on hand at the commencement of this year an unusual number of four-year transplants of white and Scotch pines, with the prospect that we would be able to use but a small portion of them in our own work. Although conditions for selling forest-planting stock at best were not favorable, we were enabled through considerable advertising and other methods of salesmanship, in which the entire department joined, to dispose of nearly 600,000 trees to 196 purchasers. By this campaign we turned into the State treasury nearly \$4,000 on the sale of stock which otherwise must have gone to waste. Although this method of disposing of our stock was new to the men in this branch of our work, and the cause of a great deal of extra work, it was efficiently carried out, and our customers were much pleased with the stock which they received and the promptness with which it was shipped. If the stock shipped for our own use and that of other State departments is valued at the same figure as that sold, the total value of the nursery product would be \$10,000.



The product from thinnings in process of manufacturing into fuel wood. These are piles drawn from the more inaccessible and rocky portions of the woodlot during good sledding conditions in the winter, and are used as an auxiliary supply near the mill in summer. One thousand cords are estimated as the product of this woodlot thinning from 100 acres.



Woodlots like this can now be operated by improvement thinnings, and the product may make a profit, or at least pay for the expenditure and improve the future stand. There are thousands of acres that are in a similar condition, due to fires having run through them or gypsy or brown-tail moth devastation. Two years ago the products from these woodlands could not have been given away, but now may be utilized to advantage. Even the dead trees, if cut in full lengths, may be sawed into firewood and by virtue of the dry condition prove desirable.



If war caused a slackening of work on some lines, in others it has increased our activities. This is particularly true of the examinations of private woodlands, which for the past two years have been made at nearly double the old rate. Reference to the table will show that most of these examinations are either for thinnings or for estimates for operating, reflecting the demand for lumber and cordwood. With a return to more normal conditions we hope that a larger proportion of the owners will want our advice and assistance along lines of reforestation.

As work on State plantations was curtailed, so was work on State forests. At Otter River we planted 55,000 trees, transplanted 100,000 seedlings in the nursery, cleaned up the fire lines along the railroad and electric car line, thinned out a few acres of woodland, and cleared about 30 acres of brush in preparation for planting. The headquarters house and barn have been reshingled.

At Myles Standish State Forest the boundary fire line, 22 miles in length, has been mowed over, and several additional miles of old wood roads have been brushed out and made passable for automobiles and teams. In some cases it was necessary to do some grading and filling in order to make the roads usable, but it is really quite remarkable what excellent highways are created by simply clearing away the brush from these old wood roads. No planting, except a small experimental area of red pine, was accomplished, and no trees were transplanted in the nursery. Some improvements have been made in the buildings. The barn has been painted, and part of the foundation renewed. The care-taker's house has had a small addition and a new chimney built onto it.

All the work on these State forests, whether it be woodchopping, planting, carpentry or masonry, is done by the care-taker and his one or two assistants.

In addition to the work on the plantations and State forests we have supervised planting and thinning work on three or four private estates, and have also set out for the Highway Commission a belt of pines on both sides of the State road between Nantucket and Siasconset, — 5 miles in length.

The third edition of our reforestation bulletin having been exhausted, we have prepared a new edition, which is now in the hands of the printers. For the first time, we have in one bulletin all the forest laws of the Commonwealth, including forestry, forest fire and gypsy moth. The bulletin on "The Forests of Plymouth County," which has been some time in the course of preparation, was issued early in the year.

REFORESTATION.

NEW WORK.

[R. p. = red pine; w. p. = white pine.]

Num- ber.	NA	ME.			Town.	Area (Acres).	Trees.	Acres brushed.
152 139 149 150 158 159 143 135	Perry, . Estabrook, Estabrook, Fullam, Fullam, Town, . Smith, Leonard,	:			Brewster,	 20 18 - 12 50 12 10 16	2,000 r. p. 7,000 w. p. 7,000 r. p. 2,000 w. p. 3,000 w. p. 15,000 w. p. 7,000 r. p. 7,000 r. p. 7,000 r. p. 6,000 r. p. 6,000 r. p.	20
124 138 140	Hansen, Morse, . Snow, .	:	:	:	Marlborough,	100 6 9	11,000 w. p. 2,000 w. p. 3,000 w. p.	

MAINTENANCE.

[R. p. = red pine; S. p. = Scotch pine; w. p. = white pine; s. = spruce.]

Num- ber.	NAME.	Town.	Area (Acres).	Trees.	Acres brushed.
113 5 84 100 35 118 119 134 80 136 75 31 90 117	Perry, W., Hodgman, Civic League, Harrington, Creamer, . Brown, Crocker, . Dean, French, Robertson, . Weeks, . Lowe, Chestnut Hill, Gaskill, .	Westminster, Peru, Marlborough, Marlborough, Barnstable, Rutland, Rutland, Oakham, East Sandwich Colrain,	28 20 80 100 19 30 45 30 40 26 75 23 500 200	4,000 r. p. 1,000 r. p. 10,000 S. p. 2,000 w. p. 15,000 w. p. 4,000 s. 15,000 r. p. 4,000 w. p. 2,000 r. p.	30

¹ These lots were examined for weevil.

LIST OF EXAMINATIONS BY COUNTIES.

		Co	UNT	r.				Number.	Acres.
Middlesex, .							.	30	965
Suffolk, .							.	2	203
Worcester, .								8	590
Hampden, .								7	936
Franklin, .								5	310
Plymouth, .								10	190
Bristol, .								3	160
Berkshire, .								9	1,490
Essex,								20	3,710
Norfolk, .								10	286
Barnstable,							.	2	80
Hampshire,							.	2	62
Totals, .						-		108	8,982

LIST OF EXAMINATIONS BY SUBJECTS.

		St	BJEC	т.			Number.	Acres.
Thinning,							32	4,129
Planting,							10	1,140
Insect and diseases,							12	372
Operating and estim	atin	g,					29	2,157
General,							11	1,109
Damage claims, .			٠				8	75
Shade trees, .							6	_
Totals,			١.				108	8,982

STOCK SOLD TO PRIVATE OWNERS.

8	SPECI	ES.		Class	Number.		
White pine, .				4-year transplants,			381,000
Scotch pine,				4-year transplants,	*1		153,000
Red pine, .				4-year transplants,			26,000
Spruce, .				4-year transplants,			34,000
Austrian pine,				4-year transplants,			5,000
Total, .							599,000

STOCK USED BY OTHER STATE DEPARTMENTS.

	i	Speci	ES.		Class.	Number
White pine,					4-year transplants,	63,000
Scotch pine,					4-year transplants,	3,000
Red pine,					4-year transplants,	1,000
Red pine,					Seedlings,	30,000
Arbor vitæ,					4-year transplants,	1,500
Spruce,					4-year transplants,	1,000
White pine,					Seedlings,	300,000
Hemlock,					5-year transplants,	1,000
Total,						401,000

STOCK USED BY FORESTRY DEPARTMENT.

	Speci	ES.		Class	Number.		
White pine,				4-year transplants,			237,000
Scotch pine,				4-year transplants,		٠.	20,000
Red pine,				4-year transplants,			100,000
Spruce,				4-year transplants,			27,000
Total,			:				384,000

INVENTORY OF NURSERY STOCK.

Spe	CIE	8.		5-Year Trans- plants.	4-Year Trans- plants.	3-Year Trans- plants.	2-Year Seed Beds.	1-Year Seed Beds.
White pine,				295,000	785,000	1,184,000	411	151
Scotch pine,				230,000	218,000	45,000	76	50
Red pine, .				-	160,000	325,000	-	-
Austrian pine,				-	24,000	-	-	-
Loblolly pine,				-	-	-	2	50
Banks pine,				-	-	-	20	-
Bull pine, .				-	35,000	-	-	-
Norway spruce,				-	273,000	-	-	-
Red spruce,				-	-	-	-	-
Hemlock, .				1,400	-	-	-	-
Arbor vitæ,				12,000	-	-	-	-
Douglas fir,				10,000	-	-	-	-
European larch,				-	-	10,000	-	12
Totals,			١.	548,400	1,495,000	1,564,000	509	263

EXPENDITURES FOR 1918 ON STATE FORESTS.

In accordance with the provisions of section 3, chapter 720, Acts of 1914, the State Forester herewith gives a statement of the expenditures on each State forest for the past year.

	(Otter R	iver	State	Fore	est.				
Planting,	٠.		,.						\$981	90
Brush cleaning, .									456	23
House and miscellaneou	IS 6	expense	es,						437	34
Nursery work,									389	30
Land purchase,			· ·						328	00
Fire lines and roads,									188	07
								-		_
									\$2,780	84
Less amount received for	or	wood s	old,						50	00
								-		
									\$2,730	84
		Savo	y St	ate Fo	rest.					
Land purchase, .	, -								\$679	53
Less amounts received i									97	00
								-		_
									\$582	53

Harold Parker State Forest.

Land purchase,	
Less amount received for hay sold,	4 00
	\$967 16
Myles Standish State Forest.	
Fire lines and roads,	\$1,329 25
House and miscellaneous account,	232 22
	\$1,561 47
Less amount received for supplies sold,	
	\$1,541 99

TREE PLANTING IN 1918.

A total of 564,210 trees of white and Scotch pine, with a few thousand of miscellaneous stock, was planted in the spring of 1918 throughout the State. This stock was sold to the public from our State nurseries, at an average price of \$7 per thousand.

These trees were distributed through the State in the following list of 115 towns and cities:—

Amherst. Arlington.	Douglas. Dover.	Holyoke. Hubbardston.
Athol.	Easthampton.	Hudson.
Attleboro.	Fitchburg.	Lakeville.
Auburndale.	Foxborough.	Lancaster.
Ayer.	Framingham.	Lawrence.
Barnstable.	Freetown.	Leominster.
Beverly.	Gardner.	Lexington.
Billerica.	Georgetown.	Lincoln.
Bolton.	Gloucester.	Littleton.
Boston.	Granby.	Longmeadow.
Bourne.	Great Barrington.	Lowell.
Boxborough.	Greenfield.	Lynn.
Cambridge.	Greenwich.	Mansfield.
Carlisle.	Groton.	Marion.
Cohasset.	Groveland.	Marlborough.
Concord.	Hadley.	Marshfield.
Dana.	Harvard.	Medfield.
Danvers.	Haverhill.	Medford.
Dedham.	Hingham.	Methuen.
Dennis.	Holliston.	Middleton.





A mixed hard and soft wood stand of 30 acres at Marion. About 300 cords of oak have been cut out, leaving the pine and some hard woods. In a few years a further cutting of oaks will be made when the stand will become entirely moth resistant. Not only are the hard woods adaptable for sale at the present time, when fuel wood is needed, but the remaining forest has a far greater potential value, as white pine is the species most largely sought after. The elimination of the gypsy moth, the improving of the forest stand, and the utilization of the hard woods at a time when the product is much needed, are all thus accomplished. This is a valuable shore property.



A pile of 16-inch fuel wood cut and split ready for market. This is a convenient size, suitable for either the grate, hearth fire or furnace. There are about 100 cords in this pile, basing a cord on wood equivalent to 4 feet high, 4 feet wide and 8 feet long. This is the wood product from thinnings shown in accompanying cuts in this report.

Palmer. Peabody.

Pepperell. Townsend. Millis. Plymouth. Truro. Montague. Natick. Quincy. Waltham. Rockland. Needham. Ware. New Bedford. Rockport. Wareham. Newbury. Rowley. Watertown. Newburyport. Rutland. Wayland. Newton. Sandisfield. Wellesley. Westborough. Sandwich. Northampton. West Bridgewater. North Attleborough. Scituate. Northbridge. Sherborn. West Brookfield. North Brookfield. Westford. Shirley. Shrewsbury. Norwell. Weston. Southwick. Williamstown. Orange. Orleans. Spencer. Winchendon. Oxford. Sudbury. Worcester.

MOTH THINNING AND WOOD UTILIZATION WORK.

Taunton.

Tisbury.

Utilization and Co-operative Operating Work.

During the past year this work has gone on with the added stimulus of high prices for forest products. We have been unable to do as much as in some past years, however, due to. the great difficulty in obtaining labor. A table of the operations carried on during the past year is appended. Fifty-three thousand dollars were expended on these operations during the past year, and the total receipts from products sold during the past year were \$64,000. A large number of examinations were made, covering over 4,000 acres, where advice as to products and utilization was given. Two bulletins were published, one on wood fuel and another on the utilization of forest products in Massachusetts. Four talks on utilization subjects were made during the year at various gatherings. It is also estimated that several hundred letters in direct response to utilization and forestry questions were written, and it is known that a number of these resulted in financial benefit to the enquirer. Aid was also given to quite a number of owners of forest products in selling their wood and lumber, and we are very much pleased to do that kind of practical work for the farmers of the State.

Cordwood and Wood Machines.

The most important single development during the past year was the cordwood situation as related to the general fuel situation, and the purchase and operation by this department of two machines for the production of cordwood as recommended by the wood fuel committee. These machines are for the purpose of cutting cordwood directly into the used (or fitted) lengths from the whole tree or from the log without going through the extra motions of first cutting into 4-foot lengths. These machines have been in operation most of the year, and have proven very successful, although we have had to learn a good many things about the business and they have not proven as financially profitable as we had hoped. However, with the experience gained we expect that they will be a great contribution to the production of cordwood by modern methods. If the market for wood continues favorable, we expect to keep them constantly in operation throughout the next year, as we now have trained men to operate them. We expect shortly to publish a bulletin describing these machines in full, together with a detailed account of costs, results, etc. They do result in a great saving of labor, as more than half the processes of converting the tree into fuel for domestic use are saved by their use, and we believe that their more general adoption is only a question of development.

War Work.

The utilization section was engaged during the past year in direct or indirect war work probably more than any other division of the department. This was recognized by the draft boards, who exempted some of the men on the grounds of occupation. We had several contracts for furnishing wood to the government, which we did at approximately cost, thus saving the government considerable money. We also were busily engaged on the wood-fuel problem throughout the year, to the exclusion of other work, and directly produced nearly 5,000 cords, and helped by advice and encouragement to the owners in the production of a good many thousand more. We also established last February, at the time of the great fuel



A hardwood thinning near Haverhill, in which the natural moth-food trees have all been removed. Most of the cord wood here cut was oak and two-thirds of it was practically dead. The species remaining are largely pine, maple, ash and hickory. This product at the present time is worth practically three to four times its former value on the lot. While the labor for cutting seems high, it is not when compared with the price of the product.



An auxiliary wood-sawing machine connected with a high-power spraying machine. Many towns and cities own the spraying machines, and by an additional expenditure of less than \$100 a very practical wood-sawing machine may thus be had. Automobile engines may also be utilized as power for driving similar machines.



shortage, a wood exchange whereby we attempted to put the owner of cordwood in direct touch with the user. It was then a frantic scramble, as many industries, buildings, etc., were practically without any kind of fuel to carry them over the extreme weather. By our aid several mills were furnished with thousands of cords of wood, also office buildings, homes, and other users, and the producers received a direct market for their product without middlemen, which could not otherwise have been done. We are still cutting more or less as a clearing house for wood, although we are not going into the business very extensively as the market is being taken care of by the regular channels. We consider our work last February to have been merely emergency work.

Chestnut.

One of our greatest problems is the utilization of chestnut. The blight is spreading rapidly, and it looks as if a few years at the most would result in the elimination of that species from the State. It is therefore necessary that the growing chestnut be cut and marketed as rapidly as possible, and at a profit. This situation applies especially to the western part of the State, where the gypsy moth is not common. We are devoting a good deal of our energies, along utilization and operating lines, to the chestnut at present, and hope to be able to do considerably more than we have done.

Co-operative Operations.

Name.	Location.	Character of Operation.
American Forestry Company,	Framingham,	Sawmill.
John W. Baker,	Saxonville,	Sawmill.
Francis R. Bangs,	Wareham,	Cordwood.
H. W. Bennett,	Marion,	Wood machine.
Cochituate forestry account,	Wayland,	Sawmill and cordwood.
D. C. Brewer,	Harvard,	Sawmill and cordwood.
F. S. Goodwin,	Dover,	Wood machine.
Lawrence Minot,	Wareham,	Cordwood.
Wayne E. Stiles,	Huntington,	Sawmill and cordwood.
G. F. Schwartz,	Dennis,	Cordwood and brush.
H. C. Mulligan,	Wayland,	Sawmill and cordwood.

THE STATE FIRE WARDEN'S REPORT.

Mr. F. W. RANE, State Forester.

Sir: — In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year.

With the exception of three weeks during the last of April and the first of May, the season has been a favorable one. During this period of drought, which occurred before the vegetation had started and at a time when unusually extensive wood and lumber operations had been carried on, the damage was very large. Over 300,000 cords of wood had been cut, covering an area of 30,000 acres; 185 portable sawmills had been in operation during the year. All this in addition to the previous cutting, with the slash and brush left on the ground, made fire conditions that were extremely hazardous. Our reports show that we had over 1,800 fires during this period, causing a loss in wood and lumber of \$38,000; buildings, \$46,000; and forested area, \$90,000.

It is very evident that if forest fires are to be controlled in Massachusetts, a more satisfactory disposition must be made of the slash and brush from wood and lumber operations. In nearly every operation carried on in the State during past years the brush and slash has remained on the ground, no disposition having been made of it, with the exception of cleaning a 40-foot strip along highways and railroad lines. The present slash law, which has been in operation for the past three years, is not accomplishing the desired results and should be amended by providing for a cleared strip at least 100 feet wide around the cuttings, so that men fighting fires will have some chance of holding them within bounds. The State Fire Warden and his assistants, together with the town forest wardens, should be responsible for the enforcement of the law, and the penalty should be made strong enough so that the operators or owners will find it to their advantage to comply with it.

Owing to the fact that a large percentage of our woodland lies within the smaller towns in the State, and the burden of taxation for extinguishing fires in many of them has been extremely heavy in past years, it seems but fair that financial assistance should be given these small towns, if we are to preserve the present forested area. I feel that if a town with a valuation of \$1,250,000 or less has expended one-tenth of 1 per cent. of its valuation for extinguishing forest fires, it should be reimbursed by the State one-half of any additional expense for fighting fires, the total amount to be paid by the State to any town in any one year not to exceed \$250.

We have maintained 35 observation stations during a portion of the year, 20 of which were in operation during the entire season. The accuracy and promptness of the observers in reporting fires, especially those who have been in the service for some years, has been extremely gratify-

ing, and many words of commendation have been received from forest wardens and selectmen, showing the efficiency of this part of the service.

Owing to the large number of forest wardens and deputies entering the United States service, it has been practically impossible to keep our town organization up to the standard; many towns have been unable to get sufficient help to extinguish even small fires. The importance of having motorized equipment for getting to fires promptly is being demonstrated more and more each year. Seventy-five towns have some form of motorized equipment, and 150 towns have sufficient equipment for handling any ordinary fire.

A 48-foot tower with a 10 by 10 foot room at the top, equipped with a ladder, has been erected on Ragged Mountain in the town of West Brookfield. This tower was purchased last year and a portion of the construction work was done, but, owing to lack of appropriation, it was not completed until July of this year. It was necessary to install 3 miles of telephone line to connect with the New England Telephone and Telegraph Company at West Brookfield. This tower was not placed in operation this year on account of favorable fire conditions.

A new 48-foot tower has been erected on the summit of Mendall Hill in the town of Acushnet. This tower has a 10 by 10 foot room, and is equipped with stairs. It covers several thousand acres of valuable woodland in the surrounding towns. The towns of Acushnet, Rochester, Freetown, Mattapoisett and Fairhaven contributed \$900 towards the cost price of the tower. One-half mile of telephone line was installed connecting with the New England Telephone and Telegraph Company at Acushnet.

For the past six years the State has maintained a forest fire tower on Robbins Hill, Chelmsford. This was a small windmill type of tower with a ladder. It has been known for some time that a much higher and heavier tower was needed at this point, in order to cover the forested area to better advantage, and last winter we asked the towns of Chelmsford, Westford, Tyngsborough, Dunstable, Dracut, Tewksbury, Billerica, Carlisle and Littleton to raise at their annual town meetings from \$100 to \$300 each for the purchase of a suitable tower with stairs at this point. This request was received very favorably by each town and \$1,750 was raised. We therefore purchased the summit of Robbins Hill and erected a 75-foot tower, with a 10 by 10 foot room at the top, equipped with stairs. This tower was completed September 1.

A new 45-foot tower has been erected at the summit of Holcomb's Hill in Chester. This is a light-weight tower, with an 8 by 8 foot room at the top, and is equipped with a ladder. I think this station commands a more wonderful view of forested area than any of the other 35 stations. The erection of the above stations practically completes the observation system of the State. It will be necessary, however, to replace one or two more of our small windmill towers by higher and heavier ones, and it may also be necessary to install two or three substations to take care of some local area that is not satisfactorily covered at this time. I am in

hopes that we can arrange to erect a new tower on Grace Mountain, Warwick, where we have maintained a 40-foot windmill tower, with no building for the protection of the observer, for the past seven years.

The Rehoboth, Barnstable, Bourne, Fall River, Mount Everett and Tolland towers were painted this year.

We have had during the year, 799 railroad fires, as follows: Boston & Albany, 224; Boston & Maine, 131; New York, New Haven & Hartford, 397; and the Central Vermont, 47. These fires burned over an area of 9,152 acres, causing a damage of \$113,000 and a cost to extinguish of \$13,000. This is the largest railroad fire loss we have had in several years, and a large part of it was due to a fire which occurred in Marshfield in April, when several buildings were destroyed, causing a damage of \$45,000.

The front ends and ash pans of over one thousand locomotives were inspected during the season, and aside from some minor defects, were found in very good condition. The tramp locomotives coming in from other States where they are not subject to rigid inspection have caused a large number of fires. We hope that fires from this cause will be lessened the coming year, through an agreement with the Federal Forest Service and the Railroad Administration Department. The railroads have experienced considerable trouble in procuring sufficient help to keep their rights of way cleaned and burned, and the result is that we shall have a large number of grass fires to contend with during the coming spring.

Over 20,000 permits for burning brush were granted this year, and several arrests were made of parties burning brush without permits. A large number of these parties were allowed to settle the cost caused in extinguishing the fires, while others were convicted and fined. During the early spring 10,000 cloth and cardboard fire notices were distributed throughout the Commonwealth. These were posted in public places and throughout the forested area where people were liable to congregate.

The co-operation between this department and the Federal department has been very satisfactory. In addition to our regular Federal allotment of \$2,500 we were allowed additional allotments of \$600 and \$252, making a total of \$3,352. The regulations governing the Federal allotment make it necessary that the fund be expended in the payment of observers, and the Federal department have therefore carried a pay roll during the entire year of from 9 to 12 observers. Early in the spring, Mr. Louis S. Murphy, acting chief of State co-operation of the forest service, made an inspection trip to several towers throughout the western part of the State. His report was very satisfactory and we anticipate that we will receive our usual appropriation from the department again this coming year.

Respectfully submitted,

M. C. Hutchins, State Fire Warden.

Forest Fires of 1918.

	Mont	HS.		Number.	Acres.	Cost to extinguish.	Damage.
December, .	191	7.		5	2	\$11	\$12
	1918	3.					
January, .				1	1	2	-
February, .				ō	11	21	-
March, .				368	3,082	2,158	9,782
April,				1,215	21,850	12,508	113,332
May,				614	10,952	10,458	77,669
June,				91	486	734	752
July,				50	299	1,019	2,699
August, .				47	429	551	589
September,				15	10	37	-
October, .				66	223	279	320
November,				75	293	265	472
Totals, .				2,553	37,638	\$28,043	\$205,627

Types of Land burned over (Acres).

					1914.	1915.	1916.	1917.	1918.
Timber, .					3,001	3,817	1,435	1,237	2,520
Second growth,					9,016	6,749	755	2,274	5,696
Second growth,	not	merc	hant	able,	7,943	9,107	1,970	4,137	6,069
Brush land,					11,645	14,681	9,990	7,126	10,549
Grass land, .					2,510	8,128	1,573	3,814	4,669
Not classified,					4,860	5,907	475	1,432	8,135
Totals,					38,975	48,389	16,198	20,020	37,638

CLASSIFIED CAUSES OF FOREST FIRES, 1913-18.

		1913.		1914.	wii.	19	1915.	19:	1916.	19	1917.	19	1918.
	N Z	Number. F	Per Cent.	Number.	Per Cent.	Number.	Number. Per Cent.						
Unknown,		650	24.2	1,174	37.0	1,134	37.7	301	30.8	634	29.2	926	36.2
Railroad,		913	34.0	830	26.0	777	25.8	412	42.1	800	36.8	662	31.2
Burning brush,		148	5.5	196	6.2	439	14.5	62	8.1	, 262	12.0	300	11.7
Hunters (smokers),		386	14.3	520	16.4	129	4.2	111	11:3	224	10.3	237	9.2
Steam sawmills,		ø	ci	က	.1.	52	τ.	23	6.5	20	64	14	9.
Children,		109	4.1	140	4.4	191	5.3	35	3.6	133	6.1	166	6.4
Miscellaneous,		476	17.71	318	6.6	363	12.4	38	3.9	117	5.4	. 111	4.7
Totals,		2,688	100.0	3,181	100.0	3,008	100.0	826	100.0	2,175	0.001	2,553	100.0

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST NINE YEARS.

	YE	AR.		Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910,				1,385	42,221	\$23,475	\$205,383	30.46	\$148 29
1911,				2,356	99,693	47,093	537,749	39.31	226 24
1912,				1,851	22,072	20,219	80,834	11.92	43 67
1913,				2,688	53,826	35,456	178,357	20.02	66 35
1914,				3,181	38,975	48,750	95,389	12.25	29 98
1915,				3,008	48,389	36,783	141,073	16.08	46 90
1916,	•			1,425	16,198	8,593	44,765	13.22	36 54
1917,				2,175	20,020	18,033	41,109	9.21	18 90
1918,				2,553	37,638	28,043	205,627	14.74	80 05

Types of Classified Damages.

					1914.	1915.	1916.	1917.	1918.
Standing trees,					\$50,697	\$73,782	\$18,786	\$24,705	\$71,706
Logs, lumber, co	rdv	rood,			4,427	23,544	4,545	4,680	37,815
Buildings, .					3,530	31,904	10,823	6,893	46,025
Bridges, fences,					331	1,936	1,638	687	1,742
Not classified,		٠	-		26,404	9,907	8,973	4,144	48,339
Totals,					\$95,389	\$141,073	\$44,765	\$41,109	\$205,627

Towns receiving Fire-equipment Reimbursement during 1918.

Bolton,			\$9 (00	Richmond,				\$23	00
Groveland,			37 8	50	Sherborn,				4	35
Hampden,			9 1	17	Southwick,				9	50
Holbrook,			7 8	50	Sutton,				46	25
Littleton,			102 2	25				-		
Otis, .			6 5	50	Total,		•,		\$276	27
Dlainwilla			91.9	25						

LECTURES AND ADDRESSES.

The following is a list of lectures and addresses delivered by the State Forester and his assistants during the year 1918: —

Cape Cod Cranberry Growers' Association.

Barnstable County Farm Bureau.

Massachusetts State Board of Agriculture.

National Wood Preservers' Association, Chicago, Ill.

New England Nurserymen's Association.

Borough Pomona Grange.

Mansfield Grange and Fuel Committee.

Massachusetts Fruit Growers' Association.

Rural Progress Meeting.

Boston Market Gardeners' Association.

New Braintree Farmers' Club.

Hyannis Board of Trade.

North Falmouth Grange.

Lynn Teachers' Club.

Newton Board of Trade.

Pomona Grange of Hardwick.

Milton Grange.

Pomona Grange, Cochituate.

Federal Horticultural Board, Washington, D. C.

Sherborn Grange.

Massachusetts Tree Wardens' and Foresters' Association.

Acushnet Grange.

Association of Massachusetts Agricultural Educators.

Society for the Protection of New Hampshire Forests.

New Hampshire Forestry Association.

Massachusetts Association of County Commissioners.

Blister Rust Conference.

Cape Cod Gypsy Moth Convention.

Allen School.

Dedham Grange.

Cambridge Public Schools.

Pomona Grange, Westwood.

Bethany Boys' Club, Roslindale.

New Bedford Farmers' Club.

Lynn Teachers' Association.

Field Meeting, State Grange, Monterey.

Westport Farmer's Institute.

STATE HIGHWAY WORK.

Along the State highways all over the State spraying for the gypsy moth and the elm-leaf beetle was done under the superintendence of this department. During the spring gypsy-moth infestations were also cleaned wherever such work could be done to good advantage. The total cost of this work for the year was \$9,384.60.

THE DISTRIBUTION OF SUPPLIES.

The following is a list of cities and towns, with amount of supplies for moth work furnished them, for the year ending Nov. 30, 1918. The amounts given are the gross amounts furnished, some of the cities and towns having made payments to the State Forester's office for all or a part of the amounts according to their net expenditures or their class under the provisions of the law. For amounts received from this office in reimbursement and supplies see the table on page 36.

List of Cities and Towns and Amounts of Supplies furnished for 1918.

	-	 			_	 _		=
Acton, .			\$893 02	Georgetown,			\$ 923	62
Andover,			10 80	Groton, .			990	22
Ashburnham,			940 931	Groveland,			290	79
Ashby, .			1,020 321	Halifax, .			461	04
Ashland, .			700 81	Hamilton,			852	53
Auburn, .			1 45	Hanover,			1,022	34
Avon, .			134 13	Hanson, .			823	10
Ayer, .			629 63	Harvard,			1,651	93
Bedford, .			916 15	Harwich,			519	12
Berkley, .			300 00	Holbrook,			552	29
Berlin, .			559 19	Holden, .			319	26
Billerica,			125 15	Hopkinton,			3	33
Bolton, .			823 32	Hudson, .			83	31
Bourne, .			1,479 041	Ipswich, .			467	75
Boxborough,			1,096 40	Kingston,			513	12
Boxford, .			874 13	Lakeville,			761	83
Boylston,			770 73 1	Lexington,			42	56
Bridgewater,			1,514 90 1	Lincoln, .			2,905	69
Burlington,			886 64	Littleton,			1,188	97
Canton, .			2,933 78	Lowell, .			3	60
Carlisle, .			967 33	Lunenburg,			1,302	60
Carver, .			2,969 63	Lynnfield,			1,222	87
Chelmsford,			580 46	Manchester,			14	69
Danvers,			40 63	Marion, .			3,854	89 1
Dennis, .			851 58 1	Marlborough,			90	80
Dover, .			672 38	Marshfield,			1,843	50
Dracut, .			1,332 51	Mashpee,			579	96
Dunstable,			581 20	Medfield,			935	53
Duxbury,			3,027 081	Merrimac,			504	26
Easton, .			1,142 01	Methuen,			1,303	75
Essex, .			342 65	Middleboroug	h,		1,757	67
Foxborough,			788 34	Middleton,			481	33
Freetown,			668 001	Newbury,			1,310	63

¹ This includes cost of sprayer.

List of Cities and Towns and Amounts of Supplies furnished for 1918-Concluded.

Norfolk,			\$242 36	Stoneham, .		. \$923 2
North Andover			48 89	Stoughton, .		. 162 1
North Attlebor			199 80	1 ~.	•	1 004 1
North Reading.		•	1,184 29	~		
North Reading, Northborough,		•	631 30			
J ,			521 54	-		
Norton,		•	1,583 91			. 1,098 8
	•	•		Topsfield, .		. 567 2
	•		,	Townsend, .		. 904 5
* * '	•	•	1,285 75	Truro,	•	. 146 4
	•		59 75	Tyngsborough,	•	. 1,471 6
		•	523 51	Waltham, .	•	. 29 2
Princeton, .		•	297 50	Wayland, .		. 1,243 6
		•	1 25	Wellfleet, .		. 244 6
Raynham, .			470 65	Wenham, .		. 547 7
Reading, .			7 02	West Boylston,		. 411 4
Rehoboth, .			236 14	West Bridgewater,		. 777 0
Rochester, .			215 32	West Newbury,		. 489 3
Rockport, .			3 50	Westborough, .		. 611 8
Rowley,			1,094 95	Westford, .		. 2,386 5
Salisbury, .			678 36	Westminster, .		. 701 1
Sandwich, .			3,717 21 1	Weston,		. 3,395 5
Scituate, .			1,424 52	Wilmington, .		. 1,798 6
Sharon,			2 31	Winchendon, .		. 984 8
Sherborn, .			779 01	Worcester, .		. 6 8
Shirley			933 67	Wrentham, .		. 397 2
Shrewsbury, .			387 40	Yarmouth, .		. 803 0
Southborough,			546 12			
Sterling,			188 22			\$102,906 7

¹ This includes cost of sprayer.

State Forest Commission,						. \$6	75
Forestry and nurseries,						. 22	60
Prevention of forest fires,						. 49	03
Special North Shore work,						. 128	47
Purchase and planting of f	orest	lands,				. 35	24
Thinning work, .						. 146	51
Traveling sprayer, .						. 130	90

\$519 50

\$1 73

FINANCIAL STATEMENTS.

GENERAL FORESTRY AND NURSERIES.

Receipts.

		100	verb	w.					
Appropriation for 1918,						\$20,850	00		
Paul D. Kneeland, agent f	or	Hubl	bard	esta	te,	16	22		
								\$20,866	22
		Expe	an dit	aimaa					
General: —		Lupe	mui	ures.					
						e7 101	20		
Pay roll,	٠	•	٠	•	•	\$7,121			
Travel,	٠	•	•	•	•	2,742 319			
Printing,	٠	•	•	٠	•	14			
Maps, books, etc., . Supplies and equipment,	٠		•	•	•				
Supplies and equipment,	•	•	•	•	•	168			
Stationery and postage,			٠		٠	11			
Express, truck repairs, etc.	,	•	•	•	•	491	49		
Nursery:—									
70 11						\$7,905	90		
Travel,					٠	φ1,903 44			
Seed,					•	896			
				•	•	654			
Supplies and equipment, Express, freight and teami				•	•	383			
Sundries, telephone, etc.,						106			
sunaries, telephone, etc.,	٠	•	٠	•	9		— .	20.060	50
								20,860	
Balance returned to tr	ea	sury I	Nov.	30,	1918	,		\$5	64
Purchase an	ND	PLAN	TIN	G OF	For	REST LAN	DS.		
		Re	ceip	ts.					
Appropriation for 1918,			-					\$10,000	00
21pp10p11401011011010,	•	•	·	•	•	• •	•	\$10,000	
		Expe	endit	ures.					
Pay roll,		•				\$9,289	53		
Travel,						384			
Supplies and equipment,									
Express, freight and teami	nø					155			
Sundries,	-0.	,				12			
		•		•	•	12		9,998	27

Balance returned to treasury Nov. 30, 1918, . . .

PREVENTION OF FOREST FIRES.

TREVENTION OF FOREST FIRES.		
Receipts.	#90.000	00
Appropriation for 1918,	\$32,000	00
Expenditures.		
Salaries,		
Travel,		
Printing,		
Construction,		
Stationery and postage, 51 41		
Sundries and supplies,		
Equipment,		
Teams, freight and express, 94 89		
Telephone,		
Town supplies,		
Truck expenses,		
Rent and purchase of land,		
	31,997	91
Dalamas material to turners Nov. 20, 1010		
Balance returned to treasury Nov. 30, 1918,	\$2	09
Office Salaries.		
Receipts.		
Appropriation for 1918,	\$6,900	00
Expenditures.		
Salaries,	6,725	15
Balance returned to treasury Nov. 30, 1918,	\$174	85
Office Incidentals.		
Receipts.	&£ 000	00
Appropriation for 1918,	\$5,000	
Mileage sold,	3	70
	\$5,003	70
Expenditures.		
Travel		
Printing,		
POST9079 1 29h 79		
Stationery and supplies,		
Stationery and supplies,		
Educational work,		
Sundries (including telephone),		
	4,963	71
Balance returned to treasury Nov. 30, 1918,	\$39	90
Darance returned to treasury Nov. 50, 1918,	фо9	อฮ

\$83,749 46

Suppression of Gypsy and Brown-tail Moths.

Receipts.

Balance on hand I Less reimbursemen								\$61,166 16,049			
Balance for 1	918 y	work	,	•				\$45,116	44		
Receipts credite	d to	appi	ropr	iatio	n:					•	
State Forest Com	missi	ion,			\$14	8 3	7				
Investigation of bl					9.	3 3	7				
Forest fire prevent					48	9 7	9				
General forestry a			ries,		12	0 3	0				
Massachusetts H											•
mission, .					9	0 0	2				
Topsfield (check r	etur	ned),				2 0	0				
Balance Nov. 30, 1	917,	on s	peci	al							
North Shore fur	nd,				1,43	9 9	6				
Balance Nov. 30,	1917	, on	Sag	a-							
more Beach fun	d,				57	3 5	8				
Appropriation for	1918	3,			247,00	0 0	0				
							_	249,957	39		
										\$295,073	83
			j	Ехре	enditure	s.					
Pay roll, .								\$20,403	83		
Travel,								11,451			
Supplies, .								107,058			
Rent of store,								300	00		
Store equipment,								121	74		
Special work,								24,314	94		
Town pay rolls,								30,493	24		
Reimbursements,								12,380	01		
Thinning work,								3,092	67		
Printing, .								187	91		
Teaming, repairs,	etc.	,						1,479	95		
Stationery, postag									66		
										211,324	37

Balance Nov. 30, 1918, . . .

STATEMENT OF RECEIPTS FOR 1918.										
	GENERAI	For	RESTR	Y AND	Nurs	SERII	ES.			
For trees sold (w										
miscellaneous, 3	32,950),						• .		\$3,893 6	62
For wood sold, Ot	ter River	Sta	te Fo	rest, .	•			٠	50 (00
									\$3,943 (62
• D		D			. Tron-					
	CHASE AI	ND P	LANT.	ING OF	FORE	est J	LANDS	S.		
Redemption of Charles K. Bolton									Ø9 <i>47</i> 6	20
F. E. Watermeyer				: .	•			•	\$347 2 177 2	
W. F. Whitney,								•	856 6	
W. F. Whitney,							Ċ		96 (
Cordwood sold:										
Kelley-Field lot,		•	•			•	•		65 (
Fenno lot, .		•	• • •			. •	•	•	77 7	
Hanson lot, .		٠	•		•	٠	•		15 (UU
Damage by fire	:									
Boston & Maine	Railroad,								40 (00
D 7 / 7	Railroad								40 (20
Boston & Maine	rramoau,	•	•							
Boston & Maine	itamoau,	•	•		•	·	Ť	-		-
Boston & Maine			•					· -	\$1,689	-
	Previ	ENTIC		Fore	st Fi			_	\$1,689	97
For equipment fre	Previ	ENTIC		Fore	st Fi			_		97
For equipment fro	Previ	ENTIC	cities	Fore	st Fi	RES.	٠.	_	\$1,689 \$ \$1,327 \$	97 94
For equipment from For fire towers:— Acushnet,	Previon towns	ENTIC	cities	Fore	ST FII	RES.	٠.	_	\$1,689 \$1,327 \$1	97 94 00
For equipment fro For fire towers:— Acushnet, Arlington,	Previon towns	entic and	cities	Fore	ST FII	RES.	٠.	_	\$1,689 \$1,327 \$1,327 \$1,00 (97 94 00 00
For equipment from fire towers:— Acushnet, Arlington, Billerica,	Previon towns	entics and	cities	Fore	ST FII	RES.	٠.	_	\$1,689 \$1,327 \$1,327 \$1,00 (0,100)(0,100 (0,	94 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford,	Previon towns	entics and	cities	Fore	ST FII	RES.	٠.	_	\$1,689 9 \$1,327 9 300 0 100 0 200 0 300 0	94 00 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut;	Previous towns	and	cities	Fore	• • • • • • • • • • • • • • • • • • •	RES.	٠.		\$1,689 \$1,327 \$1,327 \$1,000 (0.000)	94 90 00 00 00 00
For equipment from For fire towers:— Acushnet, . Arlington, . Billerica, . Chelmsford, Dracut; . Dunstable, .	Previon towns	entics and	cities	Fore	• FI	RES.	٠.	_	\$1,689 9 \$1,327 9 300 0 100 0 200 0 300 0	94 00 00 00 00 00 00
For equipment from For fire towers:— Acushnet, . Arlington, . Billerica, . Chelmsford, Dracut; . Dunstable, . Fairhaven, .	Previous towns	and	cities	Fore	ST F11	RES.	٠.		\$1,689 \$1,327 \$1,327 \$1,000 (0.000) \$1,000 (0.000) \$1,000 (0.000) \$1,500 (0.000)	94 00 00 00 00 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut; Dunstable, Fairhaven, Freetown, Littleton,	Previous towns	entics and	cities	Fore	ST F11	RES.	٠.		\$1,689 \$1,327 \$1,327 \$1,000 (0.000) \$1,000 (0.000) \$1,000 (0.000) \$1,500 (0.000)	94 90 00 00 00 00 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut, Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett,	Previous towns	and	cities	Fore	ST F11	RES.	٠.		\$1,689 \$1,327 \$1,327 \$1,000 \$1,000 \$1,000 \$1,500 \$1	94 90 00 00 00 00 00 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut, Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett, Oak Bluffs,	Previon towns	entics and	cities	Fore	ST FI	RES.	٠.		\$1,689 \$1,327 \$1,327 \$1,327 \$1,000 \$1,000 \$1,500 \$1	97 94 00 00 00 00 00 00 00 00 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut; Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett, Oak Bluffs, Rochester,	Previous towns	and	cities	Fore	ST FI	RES.	٠.		\$1,689 \$1,327 \$1	94 00 00 00 00 00 00 00 00 00 00 00 00
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut, Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett, Oak Bluffs, Rochester, Tewksbury,	Previon towns	and	cities	Fore	st Fn	RES	٠.		\$1,689 \$1,327 \$1	94 90 90 90 90 90 90 90 90 90 90 90 90 90
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut, Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett, Oak Bluffs, Rochester, Tewksbury, Tyngsborough,	Previon towns	and	cities	Fore	st Fn	RES.			\$1,689 \$1,327 \$1	94 90 90 90 90 90 90 90 90 90 90 90 90 90
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut, Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett, Oak Bluffs, Rochester, Tewksbury, Tyngsborough, Westford,	Previon towns	and	cities	Fore	ST FI	RES.			\$1,689 \$ \$1,327 \$ 300 (100 (200 (300 (150 (150 (200 (150 (200 (150 (200 (150 (250 (250 (94 90 90 90 90 90 90 90 90 90 90 90 90 90
For equipment from For fire towers:— Acushnet, Arlington, Billerica, Chelmsford, Dracut; Dunstable, Fairhaven, Freetown, Littleton, Mattapoisett, Oak Bluffs, Rochester, Tewksbury, Tyngsborough, Westford, New England Tele	Previon towns	and	cities	Fore	st Fi	RES.			\$1,689 \$ \$1,327 \$ 300 (100 (200 (300 (150 (150 (200 (150 (200 (150 (200 (150 (250 (250 (94 90 90 90 90 90 90 90 90 90 90 90 90 90

SUPPRESSION OF GYPSY AND BROWN-TAIL MOTHS.

SUPPRESSION	OF	GYP	SY	AND	DRO	WN-	LAIL	TATO	THS.	
Town of Andover, .										\$33 67
Town of Andover, . Town of Auburn, .				•						84 90
Town of Aver.										998 17
Town of Berkley, .										132 48
Town of Bolton, .				·.	÷					2 96
Town of Boylston, .					•					392 72
Town of Bridgewater,										24 76
Town of Bridgewater, Town of Danvers, .								٠.		115 38
Town of Dover, .										666 00
Town of Duxbury, .					٠					64 21
Town of Duxbury, . Town of East Bridgewa	ter,	. ,								1 50
				•						924 28
Town of Franklin, .										160 00
Town of Gloucester,										32 56
Town of Groton,										540 23
						,				212 01
Town of Hamilton,										296 95
Town of Holden, .		• .								1,131 32
Town of Holliston,										1 50
Town of Hopkinton,										828 71
Town of Ipswich, .						٠	4		٠	356 76
Town of Hopkinton, Town of Ipswich, Town of Lexington,										584 84
Town of Lincoln, .										104 72
Town of Lincoln, . Town of Littleton, .										427 74
City of Lowell, .										30 32
Town of Lympfield										1,305 72
Town of Manchester,										43 26
Town of Manchester, City of Methuen, .										776 74
Town of Natick										181 84
City of Newton, . Town of North Andove Town of North Attlebox								٠.		56 63
Town of North Andove	r,									167 92
Town of North Attlebox	roug	h.								122 25
Town of Princeton,										1,039 94
Town of Raynham,										33 58
Town of Reading, .										903 82
Town of Rehoboth,										296 66
Town of Rehoboth, Town of Rochester,										216 93
Town of Rowley, .										5 40
Town of Saugus, .										458 59
Pro A CVI										400 00
										147 99
Town of Shrewsbury,										1,571 08
- 5 0										260 50
Amount carried for										\$16,137 54

\$27,043 34

Amount brought for	ward	,				\$16,137	54
Town of Stoneham,						130	71
Town of Templeton,						1,179	81
Town of Topsfield,						2,071	56
Town of Upton, .						3	13
Town of Wakefield,						7	42
Town of Walpole, .						94	80
City of Waltham, .						179	06
Town of West Boylston						826	15
Town of Westminster,						591	01
Town of Weston, .						2,274	14
Town of Winchendon,						2,323	13
Town of Wrentham,						1,091	83
City of Worcester, .						6	31
Paul D. Kneeland, age	nt,					98	50
Boston & Maine Railro	oad,					18	84
Recreation Commission						2	40
American Railway Exp						7	00

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS.

In the following table we show the expenditures in detail for the year 1918, and also the required expenditure for 1919.

	,		19:	18.			1919.
CITIES AND TOWNS.	Re- quired Expend- iture.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Abington, .	\$1,472 36	-	-	-		-	\$1,499 08
Acton,	.827 15	\$892 23	\$832 33 1 57 30	\$65 08	\$893 02	\$945 20	829 31
Acushnet, .	609 16	-	-	_	-	-	650 66
Amesbury, .	2,840 50	-	-	, –	_	-	2,936 03
Andover, .	3,126 90	3,749 58	1,700 15	498 14	10 80	498 14	3,207 08
Arlington, .	5,000 00	-	-	-	-	-	5,000 00
Ashburnham,	528 33	895 38	115 00 1 125 00	} 192 05	940 93	957 98	542 05
Ashby,	272 16	362 36	372 00 1	–	1,020 32	845 32	280 42
Ashland, .	637 91	-2	-3	-2	700 81	_2	651 08
Athol,	2,833 00	-	-	-	-	-	2,992 78
Attleboro, .	5,000 00	-	-	-	-	-	5,000 00
Auburn, .	802 25	258 49	87 00	-	1 45	- 1	853 20

¹ Arsenate of lead sold.

² Final papers not yet filed.

			191	18.			1919.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Avon,	\$480 95	\$448 75	\$36 50	- 1	\$134 13	\$101 93	\$489 03
Ayer,	984 06	692 45	11 00 1 195 25	} -	629 63	544 27	1,228 07
Barnstable,	3,239 86	- /	-	-	- /	-	3,407 73
Barre,	1,167 38	-	-	-	-	-	1,184 64
Bedford,	773 75	1,439 29	{ 152 95 1 1,335 17	\$665 54	916 15	1,581 69	783 09
Bellingham,	461 15	0 - 1	-	-	-	-	502 83
Belmont,	4,718 18	- 1	-	- 1	-	-	5,000 00
Berkley,	245 02	219 13	59 49	-)	300 00	274 11	245 14
Berlin,	256 88	535 76	82 46	278 88	559 19	838 07	262 74
Beverly,	5,000 00	-	-	20	-	-	5,000 00
Billerica,	2,429 99	2,191 95	{ 508 90 1 128 81	} -	125 15	-	2,515 84
Blackstone,	595 51	-	-	_	-	-	808 06
Bolton,	312 86	775 15	682 75	462 29	823 32	1,285 61	322 51
Boston,	5,000 00	-	-	-	_	-	5,000 00
Bourne,	2,305 92	2,169 31	1,349 32	-	1,479 04	1,167 43	2,382 23
Boxborough,	124 72	173 71	{ 723 30 1 7 44	} 48 99	1,096 40	1,145 39	127 43
Boxford,	370 73	759 22	341 45	388 49	874 13	1,262 62	353 60
Boylston,	232 98	1,469 49	263 22	1,236 51	770 73	2,007 24	244 16
Braintree,	3,707 81	_	_	-	_	- 1	3,844 14
Brewster,	397 57	_	_	_	- 1	_	325 03
Bridgewater,	1,796 44	2,134 25	6 10 ² 1,052 88	} 162 81	1,514 90	1,502 71	1,805 40
Brimfield,	268 87	_	-	, -	-	-	291 68
Brockton,	5,000 00	_	-	-	-	-	5,000 00
Brookfield,	599 01	_	-	_	-	-	636 39
Brookline,	5,000 00	_	_	_	-	_	5,000 00
Burlington,	420 44	1,087 08	302 99	666 64	886 64	1,553 28	445 66
Cambridge,	5,000 00	_ '	_	_	_		5,000 00
Canton,	2,057 99	2,232 79	4,064 77	_	2,933 78	2,933 78	2,178 96
Carlisle,	210 13	2,143 09	601 09	1,932 96	967 33	2,900 29	201 35
Carver,	828 47	3,640 51	{ 247 50 1 1.180 00	2,812 04	2,969 63	5,781 67	796 43
Charlton,	580 48	_	- 1,180 00	-	-	_	608 27
Chatham,	893 48	_	_	_	_	_	947 40
Chelmsford,	1,915 91	1,848 21	1,504 26	_	580 46	512 76	2,004 25
Chelsea,	5,000 00	_	_	_	_	-	5,000 00
Chilmark,	164 33	_	_	_	-	_	172 32
	3,890 97						3,959 97

¹ Arsenate of lead sold.

² Supplies sold.

			191	18.			1919.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Cohasset,	\$2,466 12	-	-	-	-	-	\$2,461 57
Concord,	2,761 80	-	- 1	-	-	-	2,804 60
Dana,	182 48	-	-	-	-	-	194 23
Danvers,	3,180 27	-	-	-	\$40 63	-	3,276 13
Dartmouth,	2,259 78	-	-	_	-	-	2,361 12
Dedham,	5,000 00	-	-	_	-	-	5,000 00
Deerfield,	1,360 46	-	-	-	-	-	1,479 12
Dennis,	509 13	\$850 27	-	\$153 64	851 58	\$1,005 22	543 98
Dighton,	860 61	_	-	_	-	-	958 06
Douglas,	568 38	_	_	_	-	_	577 20
Dover,	1,000 71	876 75	\$744 81	_	672 38	_	1,067 24
Dracut,	1,095 00	2,017 56	682 24	922 56	1,332 51	2,255 07	1,138 53
Dudley,	969 54	-	_	_	_	_	997 13
Dunstable,	144 52	573 71	437 05	429 19	581 20	1,010 39	161 23
Duxbury,	1,268 17	2,612 75	1,438 66	782 08	3,027 08	3,246 66	1,355 11
East Bridgewater, .	1,307 24	_	_	_	_	_	1,344 96
Eastham,	175 82	_	_	_	_	_	177 50
Easthampton, .	3,925 74		_	_	_ '	_	4,242 09
Easton,	1,618 75	1,966 66	1,241 55	347 91	1,142 01	1,489 92	1,608 91
Edgartown,	635 11	-	_	-	-		684 33
Essex,	518 83	645 13	546 75	126 30	342 65	468 95	524 84
Everett	5,000 00		_	_	_	_	5,000 00
Fairhaven,	2,250 83	_	_	_	_	_	2,457 19
Fall River.	5,000 00	_	_	_	_	-	5,000 00
Falmouth.	2,774 32	_	_	_	_	_	2,846 73
Fitchburg,	5,000 00	_	_	_	_	_	5,000 00
Foxborough,	1,146 04	1,754 01	253 41	607 97	788 34	1,396 31	1,191 49
Framingham,	5,000 00			_	_		5,000 00
Franklin,	2,155 79		_	_		_	2,234 46
T	474 24	648 07	_		668 00	493 00	517 56
C1	4,296 30	010 01			000 00	130 00	4,556 03
C	533 93	939 59	527 57	405 66	923 62	1,329 28	534 40
Clt	5,000 00	203 09	021 01	200 00	020 02	1,020 20	5,000 00
Continu	1,334 07	677 46	195 00				1,396 48
Great Barrington, .		077 40	190 00				3,003 13
	3,469 34						5,000 00
Greenfield,	5,000 00		-		-		3,000 00

			19:	18.			1919.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Groton,	\$1,124 62	\$1,399 69	{ \$495 321 278 93	\$275 07	\$990 22	\$1,265 29	\$1,138 98
Groveland,	577 09	504 09	{ 117 45 452 15	} -	290 79	217 79	597 77
Halifax,	295 75	998 87	241 17	703 12	461 04	1,164 16	311 94
Hamilton,	1,471 49	2,116 78	1,229 24	645 29	852 53	1,497 82	1,561 12
Hanover,	725 05	1,255 74	1,258 80	591 41	1,022 34	1,613 75	777 13
Hanson,	808 13	662 35	669 44	-	823 10	677 32	824 01
Harvard,	758 79	1,570 06	1,651 23	811 27	1,651 93	2,463 20	771 45
Harwich,	759 81	1,318 45	64 15	558 64	519 12	1,077 76	779 48
Haverhill,	5,000 00	-	-	-		_	5,000 00
Hingham,	2,740 55	-	-	- /	-	-	2,811 67
Holbrook,	696 49	661 76	211 36	-	552 29	517 56	739 00
Holden,	752 17	1,545 96	373 51	793 79	319 26	1,113 05	828 56
Holliston,	806 59	-	-	-	-	-	840 67
Hopedale,	1,923 46	-	-	-	_	-	1,709 00
Hopkinton,	751 34	651 88	77 00	-	3 33	-	751 74
Hubbardston, .	326 63	-	-	-	_	-	326 19
Hudson,	1,750 70	1,271 54	8 9 55 1 659 77	} -	83 31	-	1,882 75
Hull,	4,112 01	-	-	-	-	-	4,284 04
Ipswich,	2,211 59	2,593 71	1,978 73	382 12	467 75	849 87	2,254 91
Kingston, .	638 84	948 61	345 96	309 77	513 12	822 89	658 63
Lakeville,	478 23	626 24	387 93	148 01	761 83	909 84	490 01
Lancaster, .	957 23	-	-	-	-	-	963 67
Lawrence,	5,000 00	-	-	-	-	-	5,000 00
Leicester, .	950 44	-	-	-	-	-	1,072 55
Lenox,	2,918 70	-	-	-	-	-	2,961 12
Leominster, .	5,000 00	-	-	-	-	-	5,000 00
Lexington, .	3,396 08	5,863 80	23 60 ¹ 1,681 39	} 1,965 67	42 56	1,999 72	3,410 94
Leyden,	99 09	-	-	-	-	-	108 19
Lincoln, .	755 21	1,491 68	1,816 78	736 47	2,905 69	3,642 16	751 37
Littleton, .	516 45	-	{ 749 701 68 25	} -	1,188 97	660 36	536 99
Lowell,	5,000 00	-	-	-	3 60	-	5,000 00
Lunenburg, .	668 27	1,048 40	350 33 1,786 44	380 13	1,302 60	1,682 73	683 59
Lynn,	5,000 00	-	-	-	-	-	5,000 00
Lynnfield, .	603 05	1,768 42	683 64	1,165 35	1,222 87	2,388 22	646 99
Malden,	5,000 00	-	-	-	-	-	5,000 00
Manchester, .	4,441 58	-	_	-	14 69	1 -	4,468 66
			l	1	1	1	1

			19	18.			1919.
CITIES AND TOWNS.	Re- quired Expend- iture.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Mansfield,	\$1,886 67	_	_	_	_	_	\$2,128 25
Marblehead,	4,439 43	_	-	-	-	-	4,642 13
Marion,	1,289 42	\$2,266 76	\$1,135 03	{89 84	\$3,854 89	\$3,944 73	1,305 77
Marlborough, .	4,457 76	_	-	-	90 80		4,683 77
Marshfield,	1,038 17	1,550 31	$\left\{\begin{array}{c} 125\ 00^{1} \\ 1,259\ 71 \end{array}\right.$	512 14	1,843 50	2,355 64	1,097 80
Mashpee,	185 57	2,062 19	833 94	1,876 62	579 96	2,456 58	186 18
Mattapoisett, .	733 01	-	_	_	_	-	744 37
Maynard,	1,874 24	_	_	_	_	-	1,819 15
Medfield,	857 89	531 56	$\left\{\begin{array}{c} 28\ 00^{1} \\ 356\ 10 \end{array}\right.$	} -	935 53	609 20	858 25
Medford,	5,000 00	_	-	_	_	_	5,000 00
Medway,	766 34	_	-	-			770 78
Melrose,	5,000 00	_	-	_	_		5,000 00
Mendon,	298 02	_	_	_	_	_	304 37
Merrimac,	636 86	1,194 26	288 25	557 40	504 26	1,061 66	651 71
Methuen,	4,238 23	_2	_2	-2	1,303 75	_2	5,000 00
Middleborough, .	1,961 52	3,607 78	1,581 61	1,646 26	1,757 67	3,403 93	2,013 95
Middleton,	396 36	1,287 63	534 00	891 27	481 33	1,372 60	401 84
Milford,	4,100 52	_	-	_	_	_	4,194 49
Millbury,	1,363 30	_	_	_	_	_	1,404 94
Millis,	592 77	_	_	_	_	_	640 73
Millville,	483 05	_	_	_	_	_	501 66
Milton,	5,000 00	7,868 98	6,438 66	1,434 49	_	1,434 49	5,000 00
Monson,	732 97	_	_	_	_	_	868 76
Montague,	3,199 20	_	_	_	_	_	3,423 75
Nahant,	1,663 35	_	_	_	_	_	1,653 67
Nantucket,	2,145 30	_	_	_	_	_	2,202 52
Natick,	3,143 58	6,044 88	113 75	_	-	_	3,402 99
Needham,	3,663 50	_	_	_	_	_	3,851 44
New Bedford, .	5,000 00	_	_	_	_	_	5,000 00
New Braintree, .	174 07	_	_	_	_	_	188 95
New Salem,	197 89	_	_	_	_	_	222 07
Newbury,	595 89	1,135 76	{ 613 40 ¹	} 539 87	1,310 63	1,850 50	603 38
Newburyport, .	4,531 57		574 11	_	_	_	4,582 32
Newton,	5,000 00	_	_	_	_	_	5,000 00
Norfolk,	472 55	516 88	181 20	44 13	242 36	286 49	482 04
North Andover, .	2,159 71	2,407 21	f 153 00 1		48 89	296 39	2,364 66
Tion of Andover, .	2,100 /1	2,10: 21	886 63	1 241 00	20 00	200 00	2,002.00

¹ Arsenate of lead sold.

² Final papers not yet filed.

			19	18.			1919.
CITTES AND TOWNS,	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expend iture.
No. Attleborough, .	\$3,371 41	_	-	-	\$199 80	_	\$3,332 90
North Brookfield, .	786 56	-	-	-	- `	-	832 08
North Reading, .	439 46	\$1,817 97	\$ 632 17	\$1,378 51	1,184 29	\$2,562 80	453 16
Northborough, .	777 62	811 89	193 57	34 27	631 30	665 57	773 89
Northbridge,	2,052 11	-	-	-	- 1	-	2,134 13
Norton,	701 16	1,049 61	163 33	348 45	521 54	869 99	721 70
Norwell,	505 42	1,067 06	1,134 94	561 64	1,583 91	2,145 55	505 68
Norwood,	5,000 00	-	-	- 1	-	-	5,000 00
Oak Bluffs,	865 02	- 1	-		- 1	-	905 4
Oakham,	157 15	- 1	- 1	<u>0</u>	- 1	-	181 83
Orange,	1,586 90	- 1	- 1	- 1	-	-	1,652 9
Orleans,	560 42	- 1	-	-	- 1	- 1	529 7
Oxford,	855 22	- 1	-	- 1	-	- 1	856 6
Palmer,	2,356 77	- 1	-	- 1	-	-	2,756 5
Paxton,	170 68	- 1	-	- 1	-	-	170 9
Peabody,	5,000 00	-	-		-	-	5,000 0
Pembroke,	513 71	2,411 15	1,038 72	1,897 44	2,351 66	4,249 10	541 8
Pepperell,	973 33	1,758 25	625 34	784 92	1,285 75	2,070 67	1,017 6
Petersham,	409 08	- /	-	-	-	-	428 7
Phillipston,	131 28	- 1	- 1		_	-	135 8
Plainville,	438 51	510 73	111 60	72 22	59 75	131 97	446 8
Plymouth,	5,000 00	-	_	- 1	-	-	5,000 0
Plympton,	198 07	1,264 70	12 00 1 97 30	} 1,066 63	523 51	1,590 14	196 5
Princeton,	438 93	2,746 38	116 69	2,307 45	297 50	2,604 95	447 8
Provincetown, .	1,065 05	-	-	-	-	-	1,264 4
Quincy,	5,000 00	-	-	-	1 25	-	5,000 0
Randolph,	1,120 90	- 1	_	-	-	-	1,1213
Raynham,	409 97	750 43	207 26	340 46	470 65	811 11	506 2
Reading,	3,087 12	-	_	-	7 02	-	3,233 1
Rehoboth,	446 94	- 1	-	-	236 14	-	471 2
Revere,	5,000 00	- 1	-	-	-	- 1	5,000 0
Rochester,	425 89	551 40	136 31	125 51	215 32	340 83	436 9
Rockland,	2,091 69	-	-	-	-	-	2,168 1
Rockport,	1,674 62	-	-	-	3 50	-	1,732 9
Rowley,	388 92	1,041 36	{ 360 80 1 416 97	} 652 44	1,094 95	1,747 39	405 2
Royalston,	321 46		210 91	,			357 7

¹ Arsenate of lead sold.

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				19:	18.				1919.
CITIES AND TOWNS.	Re- quired Expend- iture.	Total Net Expend- iture.		Private Work.	iı	Re- mburse- ment.	Tools supplied.	Total Amount received from State.	Re- quired Expend- iture.
Rutland, .	\$380 48	-		-		-	-	-	\$ 400 93
Salem,	5,000 00	-		-		-	-	-	5,000 00
Salisbury, .	753 44	\$1,224 70	{	\$134 94 ¹ 382 18	}	\$471 26	\$678 36	\$1,149 62	783 06
Sandwich, .	538 70	1,083 65	1	155 68 ¹ 966 60	}	357 45	3,717 21	4,074 66	575 71
Saugus,	2,979 20	_		-	ľ	-	-	-	3,127 06
Scituate, .	2,290 97	2		-2		-2	1,424 52	-2	2,473 49
Seekonk, .	805 78	-		-		-	-	-	850 77
Sharon,	1,360 82	-		-		-	2 31	-	1,409 18
Sherborn, .	655 04	1,782 39	{	344 68 ¹ 839 18	}	1,127 35	779 01	1,906 36	643 83
Shirley,	551 63	825 79	1	108·00 ¹ 170 80	1	274 16	933 67	1,207 83	574 76
Shrewsbury, .	1,370 92	1,290 95	1	98 34 1 591 40	1	-	387 40	307 43	1,453 30
Somerset, .	775 25	_		-	ľ	-	-	-	811 68
Somerville,	5,000 00	-		~		-	-	-	5,000 00
Southborough,	867 82	998 73		484 98		130 91	546 12	677 03	878 48
Spencer, .	1,394 44	-		-		-	-	-	1,424 03
Springfield, .	5,000 00	-		-		-	-		5,000 00
Sterling, .	545 18	691 90	{	198 80 ¹ 127 98	}	146 72	188 22	334 94	556 27
Stockbridge, .	1,783 43	_	1	-	ľ	-	-	-	1,804 38
Stoneham, .	2,544 14	2,542 57		1,478 09		-	923 27	737 36	2,613 96
Stoughton, .	1,953 36	1,363 93	1	37 80 ¹ 515 62	}	· -	162 18	-	2,254 84
Stow,	404 70	1,042 10	1	515 62 567 60 ¹ 308 14	1	637 40	1,664 15	2,301 55	456 71
Sturbridge, .	377 30	_	`	-	ľ	-	-	-	399 88
Sudbury, .	577 93	720 36	1	591 921 545 09	}	142 43	1,025 20	1,167 63	574 06
Sutton,	615 46	-	1	-	ľ	-	-	-	650 46
Swampscott, .	5,000 00	-		-		-	-	-	5,000 00
Swansea, .	717 36	-		-		-	-	-	731 06
Taunton, .	5,000 00	-		-		-	-	-	5,000 00
Templeton,	838 65	821 74		261 00		-	345 65	328 74	1,021 79
Tewksbury, .	1,080 63	1,816 97	١.	664 30		736 34	1,098 86	1,835 20	1,112 63
Tisbury, .	837 94	-		-		-	-	-	839 40
Topsfield, .	835 27	-2		-2		_2	567 26	-2	877 39
Townsend, .	557 20	1,377 80		598 35		820 60	904 58	1,725 18	563 69
Truro,	213 19	220 19		7 00		7 00	146 40	153 40	222 85
Tyngsborough,	344 27	2,530 22		1,808 11		2,246 77	1,471 65	3,718 42	369 37
Upton,	500 91	-		-		-	-	-	565 98
Uxbridge, .	1,622 92	-		-		-	-	-	1,743 96

¹ Arsenate of lead sold.

² Final papers not yet filed.

			19	18.			1919.
CITIES AND TOWNS.	Re- quired Expend- iture.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Re- quired Expend- iture.
Wakefield,	\$5,000 00	_	_	-	-	-	\$5,000 00
Walpole,	2,875 16	-	-	- 1	-	-	2,965 19
Waltham,	5,000 00	-	-	-	\$29 26	-	5,000 00
Ware,	2,102 10	-	-	-	-	-	2,467 70
Wareham,	2,424 35	-	-	-	-	-	2,520 54
Warren,	1,055 77	-	-	-	-	-	1,073 46
Warwick,	181 58	-	-	-	-	-	181 87
Watertown,	5,000 00	-	-	-	-		5,000 00
Wayland,	948 84	\$1,029 45	\$697 32	\$80 61	1,243 62	\$1,324 23	968 88
Webster,	2,383 03	-	-	-		-	2,573 86
Wellesley,	5,000 00	-	-	-	-	-	5,000 00
Wellfleet,	322 69	713 04	34 95	390 35	244 62	634 97	323 57
Wendell,	228 18	-	-	-	-	-	236 90
Wenham,	843 92	592 84	453 61	-	547 78	296 70	890 26
West Boylston, .	436 90	427 43	432 41	-	411 48	406 99	442 91
West Bridgewater, .	755 60	1,955 61	615 81	1,200 01	777 03	1,977 04	757 85]
West Newbury, .	406 41	328 46	{ 179 301 248 61	} -	489 39	411 44	407 98
West Tisbury, .	232 34	-	-	-	- 1	- 1	226 09
Westborough, .	1,333 93	1,542 41	592 29	208 48	611 86	820 34	1,341 81]
Westford,	929 94	505 57	\$ 508 001 1,467 08	} -	2,386 58	1,962 11	958 83
Westminster,	394 05	733 30	196 00	164 25	701 12	526 12	403 89
Weston,	1,997 26	1,930 16	600 00	-	3,395 55	3,328 45	2,012 96
Westport,	1,102 16	-	-	-	-	-	1,234 39
Westwood,	990 30	- 1	-	-	-	-	1,061 71
Weymouth,	5,000 00	- 1	-	-	- 1		5,000 00
Whately,	319 17		-)	-	-	- 1	324 15
Whitman,	2,270 11	-	-	-	- 1	-	2,282 27
Wilmington,	864 35	1,773 73	1,029 24	909 38	1,798 68	2,708 06	879 46
Winchendon,	1,791 56	3,250 03	608 13	1,283 47	984 88	2,093 35	1,813 99
Winchester,	5,000 00	-	-	-	-	-	5,000 00
Winthrop,	5,000 00	-	-		- 1	-	5,000 00
Woburn,	5,000 00	-	-	- '	-	_	5,000 00
Worcester,	5,000 00	- 1	-	-	6 31	-	5,000 00
Wrentham,	680 35	- 1		-	397 25	-	699 86
Yarmouth,	731 25	1,151 08	119 25	232 33	803 06	1,035 41	760 41

¹ Arsenate of lead sold.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.
[Alphabetically by towns and cities.]

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
157-W, Rockland,	Sumner L. Deane, .	Abington,	C. F. Shaw,	4
76-4,	Wm. H. Kingsley, .	Acton,	J. O'Neil,	2
2003-M, New Bed-	Henry F. Taber, .	Acushnet,	A. P. R. Gilmore,	3
ford. 206-W, Kippers, .	John Clancy,	Adams,	John Clancy,	5
6465-M, River, .	E. M. Hitchcock, .	Agawam,	E. M. Hitchcock,	5
161-6, Great Bar-	W. F. Milligan,	Alford,		-
rington. 274-M,	Jas. E. Feltham,	Amesbury,	A. L. Stover,	1
483-J,	A. F. Bardwell,	Amherst,	W. H. Smith,	5
	Lester Hilton,	Andover,	J. H. Playdon,	1
35 and 206,	Walter H. Pierce,	Arlington,	Daniel M. Daley, .	1
	John T. Withington, .	Ashburnham, .	Chas. H. Pratt,	2
2-3,	W. S. Greene,	Ashby,	Fred C. Allen,	2
3-5,	Ralph Tredick,	Ashfield,	Chas. A. Smith, .	5
506-W,	George Reall,	Ashland,	Theodore P. Hall, .	2
18-3,	Frank P. Hall,	Athol,	W. S. Penniman, .	5
34-R-4,	H. R. Packard,	Attleboro,	W. E. S. Smith,	3
5-12,	J. F. Searle,	Auburn,	B. F. Searle,	5
3259-М,	J. W. McCarty,	Avon,	W. W. Beals,	3
123-2,	D. C. Smith,	Ayer,	D. C. Smith,	2
144-2,	H. C. Bacon,	Barnstable, .	Robert Cross,	4
83-4,	A. C. Traver,	Barre,	Jas. A. Dwinnell,	5
8000 and 18,	P. B. McCormick, .	Becket,		-
	Irving C. Waite,	Bedford,	W. A. Cutler,	2
	J. A. Peeso,	Belchertown, .	E. C. Howard,	5
8639-2, Milford, .	L. F. Thayer,	Bellingham, .	Lewis E. Whitney, .	3
409-W,	John F. Leonard, .	Belmont,	Martin Troy,	2
1367-М,	Gideon H. Babbitt,	Berkley,	A. A. Briggs,	3
17-2,	Forrest E. Day,	Berlin,	E. C. Ross,	2
43-12,	Edson W. Hale,	Bernardston, .	E. D. Hale,	5
20,	Robert H. Grant, .	Beverly,	Jas. W. Blackmer, .	1
22-2,	E. N. Bartlett,	Billerica,	Fred L. Winship, *.	2
9250,	John H. Dwyer, .	Blackstone, .	A. J. Duggan,	5
16-3,	I. E. Whitney,	Blandford,		-
29-12,	J. M. Pardee,	Bolton,	C. E. Mace,	2
'		Boston,	Wm. P. Long,	1
38,	Walter E. R. Nye, .	Bourne,	Edward D. Nickerson,	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE Number.	Forest Warden.		Town or City.	Local Moth Superintendent.	Div. No.
102-2, West Acton,	H. J. Livermore,		Boxborough, .	S. D. Salmon, 3d,	2
19-25,	Clarence E. Brown,		Boxford,	C. Perley,	1
29-2,	John N. Flagg, .		Boylston,	Walter G. Brigham, .	5
433-R,	Jas. M. Cutting, .		Braintree,	Clarence R. Bestick, .	3
76-23,	T. B. Tubman, .		Brewster,	Allison D. Rogers, .	4
281-3,	F. C. Worthen, .		Bridgewater, .	F. C. Worthen,	4
18-2,	G. E. Hitchcock,		Brimfield,	C. W. King,	5
1041,	Wm. F. Daly, .		Brockton,	Rufus H. Carr, .	4
104-11,	P. D. Gadare, .		Brookfield,	J. H. Conant,	5
	George H. Johnson,		Brookline,	Ernest B. Dane, .	1
52-8,	Gilbert E. Griswold,		Buckland,		-
15-4,	W. W. Skelton, .		Burlington, .	W. W. Skelton,	2
		ı	Cambridge, .	J. F. Donnelly, .	2
76 and 24-M, .	Ralph C. Crowell,	ı	Canton,	Wm. H. Gallivan, .	3
76-M, Concord, .	George G. Wilkins,		Carlisle,	George G. Wilkins, .	2
16-2,	H. F. Atwood, .	ı	Carver,	H. F. Atwood,	4
14-12,	A. L. Vever, .		Charlemont, .		-
42-2,	Edw. A. Lamb, .		Charleton,	J. D. Fellows,	5
28-3,	George W. Ryder,		Chatham,	Chas. R. Nickerson, .	4
1597-R, Lowell, .	A. C. Perham, .		Chelmsford, .	Walter Shepard, .	2
		ľ	Chelsea,	J. A. O'Brien,	1
285-J,	S. W. Curtis, .		Cheshire,		_
1,	Wm. H. Babb, .		Chester,		_
4-2,	Chas. A. Bisbee,	ı	Chesterfield, .		_
149-M and 149-W,	John E. Pomphret,	ı	Chicopee,	Edw. Bourbeau, .	5
	Robert W. Vincent,	ı	Chilmark,	A. S. Tilton,	4
485-X,	A. G. Caswell, .		Clarksburg, .	A. G. Caswell,	5
268-W and 180, .	A. W. Custance, .		Clinton,	Peter R. Gibbons, .	2
260,	Wm. J. Brennick,		Cohasset,	George Young,	4
23-2,	Frank A. Walden,		Colrain,	E. F. Copeland, .	5
72 and 458-M, .	Harry E. Tuttle,		Concord,	H. P. Richardson, .	2
15-2,	Edgar Jones,		Conway,		_
	Wm. H. Mansell,		Cummington, .		_
86-W,	S. L. Caesar, .		Dalton,		-
	T. L. Thayer,		Dana,	T. L. Thayer,	5
495-W,	Wm. H. Berry, .		Danvers	T. E. Tinsley,	1
1658-5, New Bedford.	Chas. H. Meade,		Dartmouth, .	E. M. Munson,	3

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE NUMBER. Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
373-35-R, Henry J. Harrigan, . De	edham,	J. T. Kennedy, .	3
Wm. L. Harris, De	eerfield,	Wm. L. Harris,	5
8118-4, C. E. Pierce, De	ennis,	Joshua Crowell, .	4.
29-3, Ralph Earle, Di	ighton,	Albert N. Goff, .	3
11-4, W. L. Church, De	ouglas,	F. J. Libby,	5
63-11, John Breagy, Do	over,	H. L. MacKenzie, .	3
Frank H. Gunther, . Dr	racut,	T. F. Carrick,	2
Frank A. Putnam, . Du	udley,	Herbert J. Hill, .	5
Arthur N. Hall, Du	unstable,	W. H. Savill,	2
82-2, H. E. Merry, Du	uxbury,	John D. Morrison, .	14
24-2, Lester W. Bourne, . E.	. Bridgewater, .	Lester W. Bourne, .	'4
Asher Markhan, E.	. Longmeadow,	Herman W. King, .	5
24-3, Adin L. Gill, Ea	astham,	N. P. Clark,	4
306-12, John M. Gineen, . Ea	asthampton, .	Chas. Kuhfuss, .	5
67 and 76, Frederick Hanlon, . Ea	aston,	John S. Ames,	3
Maniel Roberts, Ed	dgartown, .	John P. Fuller,	4
165-25, Frank Bradford, . Eg	gremont,		-
17-11, H. A. Coolbeth, Er	nfield,	H. C. Moore,	5
C. H. Holmes, Er	rving,	C. H. Holmes,	5
51-3, Otis O. Story, Es	ssex,	Otis O. Story,	1
Ev	verett,	P. O. Sefton,	2
1686-Y, C. F. Benson, Fa	airhaven,	G. W. King,	3
822-W, Wm. Stevenson, Fa	all River,	Wm. Stevenson, .	3
136-2, H. H. Lawrence, . Fa	almouth,	W. W. Eldridge, Jr., .	4
745, G. A. Hubbard, Fit	itchburg,	G. A. Hubbard, .	2
9417-3, Hoosac Tunnel pay station.	lorida,		-
	oxborough, .	C. W. Parkhurst, .	3
352-4, Burt P. Winch, Fr	ramingham, .	N. I. Bowditch, .	2
66-12, Edw. S. Cook, Fr	ranklin,	J. W. Stobbart,	13
7-0, Oscar N. Hanson, . Fro	reetown,	G. M. Nichols,	3
161 and 191, . George S. Hodgman, . Ga	ardner,	Chas. J. Crabtree, .	5
209-25, Napoleon B. Madison, Ga	ay Head,	Napoleon B. Madison,	4
71-12 and 8046-2, . Thos. A. Watson, . Ge	eorgetown, .	Elwood T. Wildes, .	1
222-12, Lewis C. Munn, Gi	ill,	Chas. H. Whittaker, .	15
1043-M, George W. O'Maley, . Gl	loucester, .	George W. O'Maley, .	1
18-4, John S. Mollison, . Go	oshen,		-
Harold S. Veeder, . Go	osnold,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

		1		
TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
18-2,	Elmer E. Sibley, .	Grafton,	C. K. Despeau, .	5
	George L. Murray, .	Granby,	George A. Harris, .	5
5-13,	Albert C. Sheets,	Granville,		-
327-W,	D. W. Flynn,	Gt. Barrington,	T. J. Kearin,	5
1185,	J. W. Bragg,	Greenfield,	J. W. Bragg,	5
33-24, Enfield, .	W. H. Walker,	Greenwich, .	Thos. Severance, Jr.,	5
71-5,	C. M. Raddin,	Groton,	Shadrach Evans, .	2
2939-М,	S. E. Johnson,	Groveland,	R. D. Larive,	1
651-33,	E. P. West,	Hadley,	Leroy C. Sabin, .	5
106-7, Bridge-	D. M. Briggs,	Halifax,	John A. Wood,	4
water. 62,	Fred Berry,	Hamilton,	E. G. Brewer,	1
5-14,	Edw. P. Lyons,	Hampden,		-
17-F-2,	Chas. Tucker,	Hancock,		-
51-5, Rockland, .	Chas. E. Damon, .	Hanover,	Chas. B. Drew,	4
12-23, Bryant-	George T. Moore, .	Hanson,	George T. Moore, .	4
ville. 43-12,	George J. Fay,	Hardwick,	George J. Fay,	5
63-3,	G. C. Maynard,	Harvard,	G. C. Maynard, .	2
103-3,	John Condon,	Harwich,	Arthur F. Cahoon, .	4
72-4,	Fred T. Bardwell, .	Hatfield,	Seth W. Kingsley, .	5
	John B. Gordon, .	Haverhill,	M. J. Fitzgerald, .	1
17-7,	Herbert A. Holden, .	Hawley,		-
5-18,	S. G. Benson;	Heath,		-
500,	George Cushing, .	Hingham,	T. L. Murphy, .	4
26-6,	L. L. Sherman,	Hinsdale,		-
130-W and 297-M,	Melvin L. Coulter, .	Holbrook,	Walter C. Belcher, .	3
Randolph.	Winfred H. Stearns, .	Holden,	Winfred H. Stearns, .	5
5-21, Brimfield, .	Oliver H. Howlett, .	Holland,	W. A. Morse,	5
113,	W. A. Collins,	Holliston,	Herbert E. Jones,	2
1167-W,	C. J. Haley,	Holyoke,	T. A. Bray,	5
248-W,	S. E. Kellogg,	Hopedale,	C. E. Nutting, .	5
19,	George W. Smith, .	Hopkinton, .	W. A. MacMillan, .	5
24-5,	R. W. Hartwell,	Hubbardston, .	R. W. Hartwell,	5
24,	M. P. Mitchell,	Hudson,	T. J. Higgins,	2
		Hull,	J. Knowles,	4
4-11,	John J. Kirby,	Huntington, .		-
137-W,	Edw. H. Smith,	Ipswich,	J. A. Morey,	1
103,	Roland Bailey,	Kingston,	Chas, H. Childs, .	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
261-W,	N. F. Washburn, .	Lakeville,	N. F. Washburn, .	4
218-J,	Arthur W. Blood, .	Lancaster,	L. R. Griswold, .	2
1295-24,	King D. Keeler,	Lanesborough, .	King D. Keeler, .	5
362 and 3610, .	Francis J. Morris, .	Lawrence,	John A. Flanagan, .	1
66-M,	James W. Bossidy,	Lee,		-
37-5,	B. H. Fogwell,	Leicester,	J. H. Woodhead, .	5
	Oscar Hutchinson, .	Lenox,	T. Francis Mackey, .	,5
28, 29 and 506, .	F. A. Russell,	Leominster, .	D. E. Bassett,	2
9-43,	Mellen H. Briggs, .	Leverett,	I. H. Taylor,	5
480,	Osborne J. Gorman, .	Lexington,	Osborne J. Gorman, .	2
274-41,	Jacob Sauter,	Leyden,	Jacob Sauter,	5
44-W,	John J. Kelliher, .	Lincoln,	John J. Kelliher, .	. 2
17-4,	A. E. Hopkins,	Littleton,	A. E. Hopkins,	2
	Oscar C. Pomeroy, .	Longmeadow, .		_
3400,	Edw. F. Saunders, .	Lowell,	J. G. Gordon,	2
1-12,	H. A. Munson,	Ludlow,	Ashley N. Bucher, .	5
20,	J. S. Gilchrest,	Lunenburg, .	J. S. Gilchrest,	2
1174 and 5613-J, .	D. J. Dineen,	Lynn,	Arthur W. Lewis, .	1
9-3,	Lewis F. Pope,	Lynnfield,	L. H. Twiss,	1
	Watson B. Gould,	Malden,	Watson B. Gould, .	2
319-W,	Peter Sheahan,	Manchester, .	Peter A. Sheahan, .	1
281-W and 1-W,	Herbert E. King,	Mansfield,	E. Jasper Fisher, .	3
355,	John T. Adams,	Marblehead, .	W. H. Stevens,	1
117-2,	George B. Nye,	Marion,	J. Allenach,	4
	Edw. C. Minahan, .	Marlborough, .	M. E. Lyons,	2
43-3,	W. G. Ford,	Marshfield,	P. R. Livermore,	4
31-2, Cotuit,	Darius Coombs,	Mashpee,	S. H. Peters,	4
53-5,	Chas. T. Dexter,	Mattapoisett, .	F. A. Tinkham,	4
115-4 and 72,	George H, Gutteredge,	Maynard,	John F. Cleary,	2
	E. Eustis Bent,	Medfield,	G. L. L. Allen,	3
138,	Chas, E. Bacon,	Medford,	Hugh G. Kennedy, .	2
6-2,	John B. Durfee,	Medway,	F. Hagar,	3
		Melrose,	J. J. McCullough, .	2
	Carl M. Taft,	Mendon,	F. M. Aldrich,	5
54-11	Chas, R. Ford,	Merrimac,	Chas, R. Ford,	1
	George E. Douglas, .	Methuen,	A. H. Wagland,	1
	John J. Fowler,	Middleborough, .	John J. Fowler,	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
1	George E. Cook, .	Middlefield, .		_
63-14, Danvers, .	L. G. Esty,	Middleton,	B. T. McGlauflin, .	1
37-М	E. G. Burke,	Milford,	P. F. Fitzgerald, .	5
152-2,	H. L. Snelling,	Millbury,	E. F. Roach,	5
5-2,	Chas, LaCroix,	Millis,	Ralph L. Choate, .	3
1442-25,	R. S. Carpenter, .	Milton,	R. S. Carpenter, .	3
1149-J, W o o n-	R. M. McLaughlin, .	Millville,	Patrick Britt,	5
1149-J, W o o n- socket, R. I. 13-13, Readsboro,	Edw. C. Davis,	Monroe,		_
Vt. 12-12,	O. E. Bradway,	Monson,	Robert S. Fay,	5
14-4,	Thos. Verard,	Montague,	F. H. Gillette,	5
164-25,	Jasper H. Bills,	Monterey,		_
3-24,	A. J. Hall,	Montgomery, .		_
17-6,	Howard Porter,	Mt. Washington,		_
		Nahant,	Herbert Coles,	1
16-3, ,	E. W. Francis,	Nantucket, .	W. M. Voorneveld, .	4
31 and 248-W,	W. H. Connelly, .	Natick,	S. H. Hunnewell, .	2
142,	H. H. Upham,	Needham,	George Twigg,	3
	Chas, S. Baker,	New Ashford, .		_
2280 and 353, .	Edw. F. Dahill,	New Bedford,	C. F. Lawton,	3
6-4, Gilbertville, .	Frank A. Morse, .	New Braintree, .	E. L. Havens,	5
13-6, Sheffield, .	E. M. Stanton,	New Marlbor-		, _
10, Cooleyville, .	Sewall V. King	ough. New Salem, .	Sewall V. King, .	5
1112-5,	Wm. P. Bailey,	Newbury,	Percy Oliver,	1
	Chas. P. Kelley, .	Newburyport, .	Chas. P. Kelley, .	1
30, Newton	W. B. Randlett,	Newton,	W. W. Colton,	2
South, 41-23,	S. C. Watson,	Norfolk,	Wm. A. Day,	3
205-W and 265, .	H. J. Montgomery, .	North Adams, .	Jackson L. Temple, .	5
1029-Ј,	Wm. L. Smith,	No. Andover, .	Wm. L. Smith,	1
	H. W. Tufts,	North Attlebor-	F. P. Toner,	3
63-4,	Oscar C. Hirbour, .	ough. North Brookfield,	S. B. Colburn,	5
49,	George E. Eaton, .	North Reading, .	George E. Eaton, .	2
165,	F. E. Chase,	Northampton, .	Chas. A. Maynard, .	5
12-11,	C. E. Bailey,	Northborough, .	Harry Ellsworth, .	5
182, Whitinsville,	W. E. Burnap,	Northbridge, .	A. F. Whitin,	5
114-2,	Fred W. Doane,	Northfield,	F. W. Doane,	5
18-11,	George H. Storer, .	Norton,	Wm. G. Briggs, .	3
7-12,	J. H. Sparrell,	Norwell,	Fred M. Curtis, .	4

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
417-M,	F. W. Talbot,	Norwood,	Wm. P. Hammersley,	3
89,	Frank W. Chase, .	Oak Bluffs, .	Frank F. Blanken-	4
17-5,	C. H. Trowbridge, .	Oakham,	c. H. Trowbridge, .	5
232-12,	Wm. Walsh,	Orange,	Jas. W. Cooper, .	5
33-2,	Jas. Boland,	Orleans,	A. Smith,	4
9-14,	D. A. Whitter,	Otis,		-
9-5,	O. D. Vickers,	Oxford,	C. G. Larned,	5
53-W and 53-R, .	J. Summers,	Palmer,	C. H. Keith,	5
1255-W, Cedar, .	G. Van Wyck, Jr.,	Paxton	H. S. Robinson, .	5
	J. J. Callahan,	Peabody,	J. J. Callahan,	1
5-W, Amherst, .	John H. Hubbard,	Pelham,	Marion E. Richard-	5
83-3, Bryantville,	J. J. Shepherd,	Pembroke,	Wm. C. Jones,	4
8015-4 Hanover. 23-21,	G. N. Palmer,	Pepperell,	J. Tune,	2
11-2, Hinsdale, .	Arthur Kilbourne, .	Peru,		-
61,	George Marsh,	Petersham,	Daniel Broderick, .	5
176-6, Athol, 3 .	W. H. Cowlbeck, .	Phillipston, .	W. H. Cowlbeck, .	5
834 and 535-M, .	Chas. S. Kline,	Pittsfield,		
17-6,	E. H. Nye,	Plainfield,		-
	Henry A. Boerger, .	Plainville,	George H. Snell, .	3
264,	Ira C. Ward,	Plymouth,	A. A. Raymond, .	4
13-7, Kingston, .	D. L. Bricknell,	Plympton,	D. L. Bricknell, .	4
19-4, Cooleyville,	Fred W. Doubleday, .	Prescott,	C. M. Pierce,	5
13-4,	F. W. Bryant,	Princeton,	F. A. Skinner,	5
49-11,	Jas. H. Barnett,	Provincetown, .	F. G. Hill,	4
1,	Faxon T. Billings, .	Quincy,	A. J. Stewart,	3
279,	R. F. Forest,	Randolph,	John Edw. Riley, .	3
1161-W,	E. E. Chickering, .	Raynham,	G. M. Leach,	3
518-W,	H. E. McIntyre, .	Reading,	H. M. Donegan, .	2
11-12,	B. F. Munroe,	Rehoboth,	Chas. B. Douglas, .	3
		Revere,	G. P. Babson,	1
8-2,	T. B. Salmon,	Richmond,		-
12-32,	Daniel E. Hartley, .	Rochester,	Samuel H. Corse, .	4
55-X,	John H. Burke, .	Rockland,	F. H. Shaw,	4
14-4,	John C. Martin,	Rockport,	F. A. Babcock,	1
22-6,	M. A. Peck,	Rowe,		-
3-13,	Daniel O'Brien,	Rowley,	Chas. Curtis,	1
117-4, Athol, .	L. G. Forbes,	Royalston,	E. S. Stewart,	5

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
2-12,	S. S. Shurtleff,	Russell,		-
13-4,	H. Edw. Wheeler, .	Rutland,	H. E. Wheeler,	5
		Salem,	Wm. F. Cotter,	1
123-13,	Jas. H. Pike,	Salisbury,	H. C. Rich,	1
202-3, Winsted,	Chas. H. Strickland, .	Sandisfield, .		-
Conn. 76-2,	J. R. Holway,	Sandwich,	Lincoln Crowell, .	4
346-W,	T. E. Berrett,	Saugus,	T. E. Berrett,	1
4-16,	C. E. Tilton,	Savoy,		-
129-3,	E. R. Seaverns,	Scituate,	Wm. F. Ford,	4
462-J-2, Paw-	John L. Baker,	Seekonk,	C. A. Smith,	3
tucket, R. I.	W. C. Morse,	Sharon,	Fred A. White,	3
26,	A. H. Tuttle,	Sheffield,		-
130-2,	Chas. F. Dole,	Shelburne,	Chas. F. Dole,	5
	H. D. Eastman,	Sherborn,	Geo. W. Rock,	2
	A. A. Adams,	Shirley,	A. A. Adams,	2
)	E. A. Logan,	Shrewsbury, .	Robt. C. Clapp, .	5
)	Clarence N. Mellen, .	Shutesbury, .	Wm. LaFogg,	5
928-M,	F. B. Butterworth, Jr.,	Somerset,	C. Riley,	3
1		Somerville,	A. B. Prichard, .	2
22,	Louis H. Lamb,	So. Hadley, .	Louis H. Lamb, .	5
151-14,	W. J. Lyman,	Southampton, .	C. S. Olds,	5
13, Marlborough,	Harry Burnett,	Southborough, .	Harry Burnett, .	5
11, . ø	Aimee Langevin, .	Southbridge, .	Aimee Langevin, .	5
35-3,	B. M. Hastings,	Southwick, .		-
53-2,	Earl J. Potter,	Spencer,	G. Ramer,	5
20 and 98-5, Or-	F. C. Smith,	Springfield, .	Chas, E. Ladd,	5
chard. 5-12,	J. T. Wilder,	Sterling,	J. H. Kilburn,	2
53-M,	George Schneyer, .	Stockbridge, .	George Schneyer, .	5
176-W,	Albert J. Smith, .	Stoneham,	G. M. Jefts,	2
276-2 and 121-3, .	Fred H. Pye,	Stoughton, .	W. P. Kennedy, .	3
225-X,	W. H. Parker,	Stow,	H. W. Herrick,	2
6-1,	C. M. Clark,	Sturbridge, .	C. M. Clark,	5
5-4,	Seneca W. Hall,	Sudbury,	W. E. Baldwin, .	2
46, South Deer- field.	A. C. Warner,	Sunderland, .	Richard Graves, .	5
58-4,	R. H. Richardson, .	Sutton,	R. H. Richardson, .	5
1911-J, Lynn, .	Everett P. Mudge, .	Swampscott, .	Everett P. Mudge, .	1
468-W,	T. L. Mason,	Swansea,	A. E. Arnold,	3
				1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
1-320,	Fred A. Leonard, .	Taunton,	H. M. Briggs,	3
78-2, 78-3 and 30,	C. A. Fletcher,	Templeton, .	J. B. Wheeler,	5
4249-J,	H. M. Briggs,	Tewksbury, .	H. M. Briggs,	2
161-4,	E. C. Chadwick, .	Tisbury,	H. W. McLellan, .	4
269-7,	R. E. Clark,	Tolland,		-
	T. Jesse Fuller,	Topsfield,	Harrison C. Ashley, .	1
70 and 51-2,	F. J. Piper,	Townsend,	G. E. King,	2
·	Walter F. Rich,	Truro,	J. H. Atwood,	4
61-14,	Thos. Goodchild, .	Tyngsborough, .	C. J. Allgrove,	2
	George R. Warren, .	Tyringham, .		-
15-2 and 8000, .	George Z. Williams, .	Upton,	Clarence L. Goodrich,	5
101,	H. W. Phoenix,	Uxbridge,	Willard Holbrook, .	5
59,	W. E. Cade,	Wakefield,	W. W. Whittredge, .	12
9-11 and 9-23,	L, H. Thompson, .	Wales,	M. C. Royce,	5
Brimfield.	Jas. J. Hennessey, .	Walpole,	Philip R. Allen, .	3
6,	George L. Johnson, .	Waltham,	W. M. Ryan,	2
	M. J. Buckley,	Ware,	F. Zeissig,	5
45-23,	D. C. Keyes,	Wareham,	J. J. Walsh,	4
	Timothy M. Collins,	Warren,	Alex A. Gendron, .	5
73-12,	C. A. Williams,	Warwick,	Chas. Bass,	5
12-4, Becket, .	Arthur L. Hayes, .	Washington, .		-
116, Newton, North.	Van D. Horton,	Watertown, .	Van D. Horton, .	2
North. 31-3,	Howard C. Haynes, .	Wayland,	D. J. Graham,	2
101-R,	E. L. Wallis,	Webster,	C. Klebart,	5
9,	John P. Doyle,	Wellesley,	Thos. T. Watt,	3
	John Holbrook,	Wellfleet,	Wm. H. Gill,	4
74-31, Orange, .	C. F. White,	Wendell,	G. E. Mills,	5
74,	Jacob D. Barnes, .	Wenham,	J. E. Kavanagh, .	1
	E. J. Burpee,	West Boylston, .	Harry E. Lowe, .	5
	W. P. Laughton, .	W. Bridgewater,	O. Belmore,	4
114-3,	John H. Webb,	W. Brookfield, .	John H. Webb,	5
	Louis H. Flook,	W. Newbury, .	Frank D. Bailey, .	1
6961-J and 1504, .	E. B. Jones,	W. Springfield, .	George W. Hayden, .	5
8010,	B. P. Bissell,	W. Stockbridge, .		-
92-3,	Wm. J. Rotch,	West Tisbury, .	Jerry B. Mayhew, .	4
153-12,	T. W. Humphrey, .	Westborough, .	George E. Hayden, .	5
111-Y,	Thos. H. Mahoney, .	Westfield,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
44-11,	H. L. Nesmith,	Westford,	H. L. Nesmith, .	2
1482-2, East-	Myron M. Clapp, .	Westhampton, .		-
hampton.	W. F. Neal,	Westminster, .	G. A. Sargent,	5
1329-М,	B. R. Parker,	Weston,	E. P. Ripley,	2
41-21,	Frank Whalon,	Westport,	Christopher Borden, .	3
	E. E. Smith,	Westwood,	Martin Sorenson, .	3
185, ,	W. W. Pratt,	Weymouth, .	C. L. Merritt,	3
39-14,	John H. Pease,	Whately,	Rylan C. Howes, .	5
349-W,	C. A. Randall,	Whitman,	C. A. Randall, .	4
1-4,	Henry I. Edson, .	Wilbraham, .	Henry I. Edson, .	5
8011-2,	John L. Brown,	Williamsburg, .		-
329-W,	W. H. Davies,	Williamstown, .	Wm. H. Davies, .	5
28-2,	Oliver McGrane, .	Wilmington, .	Oliver McGrane, .	2
102-4,	Theron C. Flint, .	Winchendon, .	Benj. Sepka,	5
	David DeCourcy, .	Winchester, .	S. S. Symmes,	2
201-12,	Amos S. Ferry,	Windsor,		-
·		Winthrop,	Harry Hills,	1
	Frank E. Tracy, .	Woburn,	H. V. Macksey, .	2
7137, Park,	W. N. Avery,	Worcester,	Thos. E. Holland, .	5
10-22,	Chas, A. Kilbourn, .	Worthington, .		_
69,	George H. E. Mayshaw,	Wrentham,	H. Gilmore,	3
53-31, Barnstable,	J. W. Hamblin,	Yarmouth,	John R. Eldredge, .	4

SUMMARY OF RECOMMENDATIONS.

- 1. That the General Court appropriate for the use of the State Forester sufficient funds to enable him to begin the planting and development of State forests.
- 2. Past experience makes it clear that in order to deal more effectively with the forest-fire evil more stringent rules and regulations governing the disposal of slash or brush should be enacted into law.
- 3. The enactment of a law prescribing the manner of measuring wood when sold or offered for sale in a form other than 3 or 4 foot lengths, and the further regulation of the sale of cordwood.
- 4. That provision be made by law for extending financial aid to certain towns in the extinguishment of forest fires.

F. W. RANE, State Forester.

THE MASSACHUSETTS STATE FORESTER

FRANK W. RANE

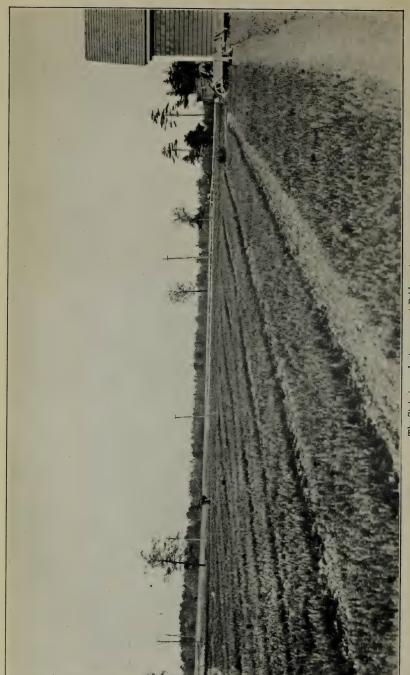
SIXTEENTH
ANNUAL REPORT
1919



PUBLIC DOCUMENT, NUMBER SEVENTY-THREE







The State transplant nursery at Bridgewater.

THE

STATE FORESTER

OF

MASSACHUSETTS:

SIXTEENTH ANNUAL REPORT 1919

F. W. RANE, STATE FORESTER



BOSTON

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1920

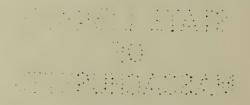
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STATE LIDUARY OF MALGICLOSSES

MAY 21 1920

State Officere

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APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.



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The Commonwealth of Massachusetts

SIXTEENTH ANNUAL REPORT OF THE STATE FORESTER.

To the General Court.

I take pleasure in submitting herewith a brief outline of the activities of the State Forester for the past year, together with the organization and data that should be definitely recorded.

While we feel that the public have been aware of the strenuous activities of the State Forester and his broad field of work in past years, which has included, besides perfecting a State forest policy for Massachusetts, the gypsy and brown-tail moth suppression, aggregating the supervision of an expenditure of a million dollars a year, and other important work assigned from time to time, such as handling the unemployed, etc., it still remains for the writer to say that these times are incomparable with the complications that have developed during the past year.

When an organization is running well and its policies are clearly defined and understood, there is little trouble meeting all ordinary emergencies. When, however, such calamities as war conditions break in upon a department like this, and fairly strip it of labor, both skilled and ordinary, and materials of all kinds advance in price while appropriations remain the same, or are made less, it inevitably follows that a department is powerless to do aught else than adapt itself to the new conditions.

In submitting this, the sixteenth report of this department, and the fourteenth report of the writer, I am citing the above simply to call to mind conditions that a State official charged with the responsibilities of State Forester in Massachusetts has had to contend with.

It is not my desire, however, to strike any note of pessimism in this report, for, regardless of the war clouds and the resultant disadvantages and inconveniences, we have, like all typical Americans, risen to the emergency and found ways of solving our problems.

The activities of the year have been exceedingly numerous. While the possibility of covering our broad field of work the first part of the year was doubtful, as the season advanced we found new means, so I can frankly say that the year as a whole has been well rounded out, and it is with a degree of pride for our accomplishments that this report is submitted.

Almost immediately following the signing of the armistice there was a wave of increasing interest in forestry matters. We believe the object lessons that our soldiers gained from the forestry standpoint while abroad will help in molding the future in forestry work in our own country.

The important part that forest products played in winning the war is well recognized at the present time. As each shipload has returned, just so many men have sung the praises of the French forests, and their great economic importance to the Allies in the world struggle.

Although staggering under a most burdensome debt, England has already enacted legislation setting aside millions of dollars for reforestation and other forestry work. We predict a greater interest in forestry from now on, particularly here in New England, where it is greatly needed.

The giving of free advice and the making of examinations of forest tracts by the State Forester and his assistants has been continued, though not as much as in pre-war times. The high price of labor and the inability to get experienced woodsmen were natural handicaps. With the relatively high prices of forest products, however, there was an inclination on the part of many to operate.

The administration of the five newly acquired State forests demanded considerable attention. The financing of this work was somewhat complicated, as there was no definite appropriation for carrying it on by the department, and funds were made available through the courtesy of the State Forest Commission.

Reforestation work to the extent of practically 1,000 acres,

in which 845,000 transplants were set out permanently on these State forests, was carried on last spring. There were 740,000 seedlings transplanted from our State nurseries into newly made nursery beds on these same forests for future use.

It is our plan to center more of our activities in general forestry undertakings upon these forests in the future, so as to have an interest develop here that would radiate throughout the section. These forests are fortunately well scattered over the State, and may be made to serve the purpose of good object-lessons in all kinds of forestry methods. Three of these forests have already permanent caretakers who live on them throughout the year. Some of the forests are beginning to be sought after as vacation and recreation grounds. The Myles Standish Forest, in particular, which has a number of beautiful lakes in it, is being laid out into camping and bungalow sites. Already nearly one hundred of these have been taken, and we have a large list of applicants on our waiting list.

The general care of these forests is vested in this department, and signed permits covering the regulations are executed in each case.

Forest fire equipment, patrols, lookouts and fish and game regulations on these State forests have also been made to conform to definite regulations.

Our three State nurseries at Amherst, Barnstable and Bridgewater have all been producing to full capacity excellent stock, which has been a great asset in our State work. Besides the trees given to the State forests, 255,000 were used in our cooperative reforestation work, there being a total of 165 lots that have been turned over to the State for planting in accordance with the reforestation law. Several lots which were earlier turned over in this way have been redeemed by the owners during the year.

We sold outright to private owners during the year 467,000 small trees; also a large number of trees from these nurseries were given to various State institutions free of charge.

The greatest drawback in nursery work was caused by the inability to secure tree seeds. While we were fortunate in getting our orders placed early, and in securing a large part of them, it developed later that evergreen seeds were not to be had

at any price. This same condition is likely to prevail the coming season; however, we have assurances from seedsmen abroad that a portion of our supply is secured to us.

Through a co-operative arrangement with the Massachusetts Department of Agriculture and the United States Department of Agriculture a contract was entered into whereby all of the plantations that were set with imported white pine stock in 1909 were gone over and all wild currant and gooseberry were removed. A detailed report of this work is to be found elsewhere.

During the past year we have completed our State-wide policy of establishing permanent forest fire observation stations on all the principal heights in the State. We now have a total of 37, of which 32 are of steel construction of our own design, and most of which have been erected by our State Fire Warden, Mr. M. C. Hutchins, and his own men.

Besides doing our own construction work, which has been a great saving in expense, about 150 miles of telephone wire have been put up by these same men, largely through the woods, for connecting these towers with local towns and cities, thus enabling the observer to give warning and get fire fighters when needed. This service now reaches 1,800 forest wardens and their deputies throughout the State. Our forest fire loss has been less than \$100,000 a year on the average since 1911, when it was over \$600,000. About 20,000 permits for setting fires were issued during the year. Many towns have taken advantage of the reimbursement act, the total paid to date amounting to \$22,000. The towns themselves have spent an equal amount. Ten thousand cloth fire notices have been distributed throughout the State during the year, and a new forest-fire motor truck was installed in Worcester County, making two now owned by this department. This auxiliary equipment will prove to be a great insurance for the State's forest lands against fire.

The district forest wardens examined about 1,000 railroad locomotives during the year. We were allowed \$3,000 by the Federal government in our co-operative forest fire work. This in brief is a comprehensive statement of our present accomplishments in this work.

During the past year we have continued the work of aiding woodland owners in the utilization of their forest products, both

in operating and marketing. In each case, however, the work has been done with a definite purpose in view, namely, that the property treated should be given proper forest culture for future results. In all this work the capital used was furnished by the owner and this department simply supervised the operation. It is believed such practical demonstrations are greatly appreciated, and will go very far in showing our woodland owners the best way to handle their forest property. A very fair showing was made in utilizing much of the chestnut dying of the blight; also in the use of oak stands that have been injured as the result of the gypsy and brown-tail moth depredations.

The gypsy moth work during the past season, taking everything into consideration, was handled even better than was anticipated. The oldest infested sections of the State were practically free from stripping. The worst conditions, as was expected, were to the south of Boston, particularly on the Cape, and to quite an extent throughout Norfolk County. The Cape has become generally infested, and the residents of that part of the State have come to our assistance and are co-operating with this department in getting equipment and materials to work with. While the conditions are really at their worst, and have been for two years, still, it is predicted by the writer that conditions will improve rapidly throughout this section in a few In Norfolk County we find in many sections a very large acreage of hardwood and pine mixtures, wherein white oak and gray birch play a very important part. As these two species are the ones most sought after by the gypsy-moth larvæ, it naturally follows that these conditions are ideal for their development. Where it is practicable to free white pine stands of oak and birch it is advisable. Many of the towns in this section are not properly equipped with modern spraying machines and trained men to cope with the situation. believed more and better attention, however, can be expected here next season.

Throughout Middlesex County a vast amount of very constructive work has been accomplished this year through a well-directed effort in inducing the woodland owners to eliminate the food trees that are preferred by the moths to others. These thinnings have been utilized largely as firewood, cut up into 12

and 16 inch lengths and have found a ready market. A number of cities and towns have purchased portable machines which are available for this work. A charge is made per cord so that the equipment is finally paid for, and the local town official charges for the services of himself and crew. This work was carried on in 12 cities and towns the past year, with a total of 3,000 cords of wood made available for domestic use. From this experience it is demonstrated that a great deal of desirable fuel can thus be made available, and at the same time the woodlands can be improved by the operation.

The brown-tail moth made its appearance again last spring to a limited extent in widely different sections of the State. One of the largest colonies was found along the New Hampshire line in Salisbury, where about 2,000 nests were destroyed. A second outbreak of importance was in Central Worcester County. In every case they were closely scouted and destroyed. Special instructions have been sent out to all local officials to use very drastic measures in dealing with this insect wherever found.

The work in co-operation with the cranberry growers has resulted in a much better understanding of the problem of preventing the gypsy moths from devastating the bogs. A report of the cranberry committee is printed elsewhere.

An important meeting of the North Shore people, composed of both the summer and permanent residents, was held at the Horticultural Hall, Manchester, on September 12, at which time the State Forester gave a talk emphasizing the importance of forestry to the section, and pointing out where certain lines of work could be done. A permanent organization was perfected, and a second meeting was held on November 10, when plans were outlined for future work and various committees reported progress. As this section of the State is very progressive, it is to be expected that some very excellent work will be the outgrowth during the coming year.

During the latter part of July and the first part of August the State Forester spent two weeks in the Berkshires, making head-quarters at the Forest Lodge on the Arthur Wharton Swann State Forest. Daily trips were taken from here, making a study of the conditions of the whole section and meeting many forest

owners. At this time plans were perfected for operating the blighted chestnut on the Swann State Forest the present winter. The Savoy State Forest was also carefully examined on this same trip, at which time it was noted that the plantations here were doing exceptionally well.

On November 5 the State Forester and two of his assistants had a conference with a committee of the Eastern Shook and Wooden Box Association at the City Club, Boston, at which time plans were outlined for definite future co-operative work with that association and the New England State forest officials. It is believed that much good may result to future forestry in bringing these interests together.

ORGANIZATION.

There have been comparatively few changes during the year. Mr. C. R. Atwood, who was in France with the 20th Forest Engineers, has returned and taken up work in the line of forest utilization in the department. Mr. Saul Phillips, who has been in charge of the North Shore moth work for years, resigned to go into corn borer work. Mr. M. E. Fenn, district fire warden, resigned during the year. Mr. J. R. Simmons, assistant in reforestation work, also resigned to accept the position of secretary of the New York State Forestry Association.

The organization of the department throughout the year was as follows:—

GENERAL STAFF.

F. W. RANE, B.Agr., M	.Sc.,			State Forester.
C. O. BAILEY, .			Ċ	Secretary.
ELIZABETH HUBBARD,				Bookkeeper.
ELIZABETH T. HARRAGE	IY,			Stenographer.
JENNIE D. KENYON,				Stenographer
MABEL R. HAMNETT,				Clerk.
DOROTHY J. SANFORD,				Assistant clerk.

		GE	NERAL	FORESTRY.	
Н. О. Соок, М.Г.	,			. Assistant forester in charge.	
JAMES MORRIS,				. Assistant.	
EBEN SMITH,				. Superintendent, Barnstable Nurser	ry.
J. A. PALMER,				. Superintendent, Amherst Nursery.	
H. H. CHASE,				. Field foreman.	
R. B. PARMENTER,				. Field foreman.	
FRED W. PARKER,				. Field foreman.	
JOHN H. SAXTON,				. Field foreman.	
AVERY GARDNER.				. Field foreman.	

MOTH WORK.

GEORGE A. SMITH, .		Assistant (equipment, accounts, etc.).
PAUL D. KNEELAND, M.F.,		Assistant (woodlands, products, etc.).
CHARLES R. ATWOOD, .		Assistant.

District Moth Men.

1.	M.	H.	DONOVAN,	Beverly.
----	----	----	----------	----------

- 2. Wm. A. Hatch, Marlborough.
- 3. JOHN J. FITZGERALD, Haverhill.
- 4. C. W. PARKHURST, Foxborough.
- 5. W. F. Holmes, Wareham.
- 6. H. B. RAMSEY, Worcester.

FOREST FIRE PREVENTION.

M. C. HUTCHINS, State Fire Warden.

JOSEPHA L. GALLAGHER, . . . Clerk.

District Forest Wardens.

- 1 James E. Moloy, Woburn.
- 2. Francis V. Learoyd, Lynn.
- 3. Jos. J. Shepherd, Pembroke.
- 4. John P. Crowe, Westborough. 5. Albert R. Ordway, Westfield.

Observers and Location of Fire Towers.

Mrs. John Condon, Harwich. JOSEPH W. JENKINS, Barnstable. W. I. Moody, Falmouth. W. F. RAYMOND, Bourne. F. L. BUCKINGHAM, Kingston. Mrs. Allan Keniston, Martha's Vineyard. S. EDWARD MATTHEWS, Middleborough. JOHN H. MONTLE, Fall River. R. J. ZILCH, Rehoboth. CHAS. F. KIMBALL, Hanson. EDWARD D. SPRAGUE, Hingham. JAMES E. SULLIVAN, Sharon. FRED R. STONE, Sudbury. WM. H. TYZZER, Jr., Wakefield. C. E. BLOOD, Chelmsford. OSCAR L. NOYES, Georgetown. CAPLIS McCormack, Manchester. ROBERT McLAUGHLIN, Mendon.

MICHAEL E. LYONS, Westborough JAMES W. MALEY, Wachusett Mountain. MARK W. SHATTUCK, Watatic Mountain. WM. E. TAYLOR, Warwick. HARLAND BURROWS, Pelham GEO. B. SHERMAN, Brimfield. THOMAS MAGOVERN, Charlton. E. J. VAILENCOURT, Mount Tom N. C. WOODWARD, Shelburne Falls. H. H. FITZROY, Savoy. DAVID M. SMITH, Waltham. ELMER HUNT, Chester. JOHN E. CURTIN, Tolland. CLAYTON BUNT, Mount Everett. ROBERT MILLER, Lenox. HARRY GEORGE, Williamstown. ALTON B. ELLIS, Acushnet. ALVA SIKES, West Brookfield.

STATE FORESTS.

The year has been marked by considerable progress in the development of our State forests. This was made possible by the decision of the State Forest Commission to expend about \$20,000 of its appropriation in this work.

At our largest State forest, the Myles Standish, in Plymouth, 480,000 white and Scotch pines were planted during the spring. A new nursery site was selected in the rear of the bungalow, a

water system installed, and 250,000 pine seedlings transplanted into it. The fire warden has erected a small steel observation tower and extended the telephone to the bungalow. The boundary lines, 22 miles in length, have been mowed over, and about 8 miles of the principal roads bushed out. Some 10 acres of scrub oak growth near the buildings have been cleared, partly as a means of fire protection and partly to assist the fine pine plantation growing therein. We are greatly encouraged by the results that some of the white pine plantations set out in scrub oaks six years ago are showing in this type of land. A new garage has been built near the superintendent's house, and a few minor repairs made on buildings.

On the Harold Parker Forest 45,000 white pines were set in the west section, and two or three old cart roads bushed out.

On the Otter River Forest 175,000 four-year-old white pine transplants, all from the nursery on the forest, have been planted, and 300,000 seedlings have been set in the nursery. An old town road and two or three cart roads in the south part of the forest have been bushed out, and the fire lines along the railroad and electric line have been kept in repair.

At the Savoy Mountain Forest 145,000 trees, largely spruce, were planted, and 150,000 pine and spruce seedlings were set in the nursery. There is so little brush land on this forest, and so much of it is made up of clear, open pasture lands, that the bushing of land or roads does not appear in the administrative work.

On the Swann Forest no planting was done, but a small nursery was started with 40,000 seedlings. The forester who has charge of our work in the western part of the State lives in the farmhouse, and makes this forest his headquarters. This arrangement provides a caretaker for the forest at no direct charge to the forest itself. The chief problem in connection with this forest is the utilization of 300 acres of chestnut which are dead or dying, and many of which are below a merchantable size. The State Forester received from the General Court an appropriation of \$10,000 to operate this land. Work has already commenced under the forester in charge of utilization, and will continue during the winter.

Expenditures for 1919 on State Forests.

In accordance with the provisions of section 3, chapter 720, Acts of 1914, the State Forester herewith gives a statement of the expenditures on each State forest for the past year.

STATE FOREST	r.		Planting Expenses.	General Upkeep, Fire Lines, Roads, etc.	New Land.	Total.		
Myles Standish,		,	\$3,975 23	\$3,609 02	\$450 00	\$8,034 25		
Harold Parker,		٠.	523 71	1,064 37	242 00	1,830 08		
Otter River,			1,642 16	1,744 37	40 00	3,426 53		
Savoy Mountain, .			1,010 10	1,190 33	1,540 00	3,740 43		
Arthur Wharton Swann,			-	1,168 32	_	1,168 32		
Total,			\$7,151 20	\$8,776 41	\$2,272 00	\$18,199 61		

STATE PLANTATIONS.

The term "plantation" is applied to those smaller tracts of land, some of which are given to the State, in distinction from the large tracts which we call State forests. Four small tracts were added during the year, so that the total number is now 165. Sixteen lots were reforested in whole or in part during the spring, half of which were new lots which had not been reforested before, and the other half were lots previously planted, but which needed replanting in part. Two hundred and fifty-five thousand transplants were used in this work. In addition, on 13 lots brush was cut, either preparatory to planting or to release from suppression pines set out in previous years. Two hundred seventy-five acres were gone over in this way.

REFORESTATION WORK.

PLANTING.

[W. p.=white pine; r. p.=red pine; A. p.=Austrian pine; S. p.=Scotch pine; s.=spruce; f.=fir.]

	Lot.		T	'own.	Area (Acres).	Trees.			
Baker-Haven, Civic League,	•		Rutland, . Nantucket,	•			•	20 50	5,000 w. p. 30,000 w. p. 5,000 r. p. 3,500 A. p. 1,500 S. p.

PLANTING — Concluded.

Lor.	Town.	Area (Acres). Trees.
Baker-Hurd,	Barre,	132 12,000 w. p. 3,000 S. p.
Baker-Thompson,	Hubbardston,	36 5,000 S. p.
Baker-Kendall,	Hubbardston,	72 26,000 w. p.
Schley,	Rockport,	70 12,000 w. p. 3,000 s. 2,000 r. p.
Geer,	Belchertown,	7 4,000 w. p. 4,500 S. p.
Barber,	Chelmsford,	4 4,000 r. p. 500 s.
Thayer,	Leicester,	18 10,000 w. p.
Leonard, 1	Raynham,	16 5,000 w. p.
Fullam, 1	Oakham,	22 8,000 w. p.
Hansen, 1	Marlborough,	100 26,000 S. p.
Smith, 1	Barnstable,	17 10,000 r. p.
Harrington, 1	Westminster,	100 10,000 S. p. 26,000 w. p.
McLaughlin, 1	Sandwich,	52 20,000 r. p.
Weeks, 1	Sandwich,	20 2,000 f.
Town, 1	Templeton,	60 4,000 w. p.
Dean, 1	Rutland,	70 10,000 S. p.

¹ These lots were filled in after original planting.

BUSHING.

Lot	2.			To	wn,			Area (Acres).	Brushed.
Briggs,				Oakham, .				11/2	11/2
Thayer,				Leicester, .				18	18
Baker-Thompson,				Hubbardston,				36	5
Baker-Haven, .				Rutland, .				20	8
Fullam,		. '		Oakham, .				22	10
Johnson,				Ashburnham,				25	25
Shapleigh,				Ashburnham,				32	32
Smith,				Barnstable,				17	17
Harrington,				Westminster,				100	50
Fullam,				Oakham, .				115	10
Town,			-	Templeton,				60	60
Davis & Hadley, .				Templeton,				107	12
Chestnut Hill, .				Spencer, .			٠.	300	24

NURSERY WORK.

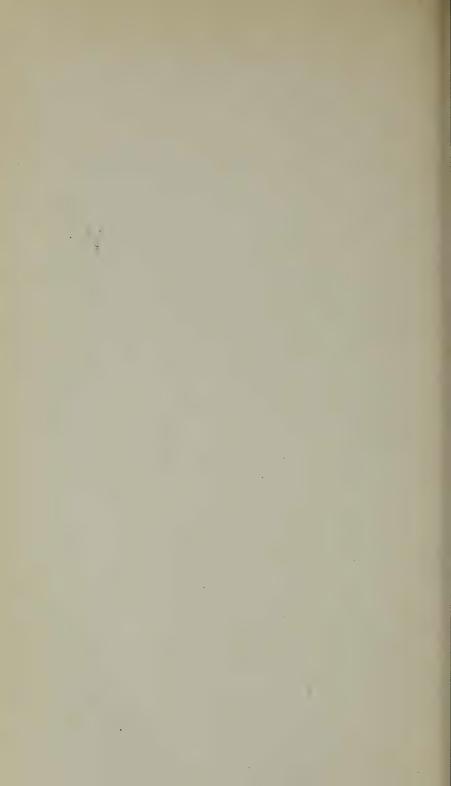
Under this heading we include the work carried on at our three principal nurseries at Amherst, Bridgewater and Barnstable, but do not include the product of the nurseries located on the State forests, which are carried on by funds provided for the administration of these lands. In spite of the fact that we made no special effort to sell stock to private parties, and were. in fact, somewhat reluctant to let our stock go in this way, we received orders for almost as much stock as we sold in 1918, when we were putting forth special efforts along this line. Altogether about 500,000 transplants were sold, over 1,000,000 were used in the work of the department, and 300,000 were given to other State departments. We shall not have on hand next spring as much stock as was available this past spring, and the situation for the next two or three years gives us much concern. On account of the blister-rust agitation, which was disastrous to the nursery and forest seed business, followed by war conditions, it has been next to impossible to get forest tree seed for the past three or four years, and that means that our available supply of transplants, instead of increasing as it should, will be below normal in amount for some time. In this respect all forest nurseries, both private and State, are in the same condition. Had the conditions remained normal, our Massachusetts program would easily have enabled us to have been planting at least 10,000,000 trees throughout the State during the past year. The demands for white pine stock exceeded our supply, and, contrary to expectation, the red pine was not very popular, although we had an exceptionally fine stock. The Scotch pine, due to various causes, particularly the damage from girdling by mice two years ago, was generally avoided. Regardless of the danger from blister rust, our lumbermen and larger planters insist on using white pine, preferring to take their chances for results with this species. Our nurseries are all in excellent condition.



A plantation made in the town of Sandwich. The land is typical Cape sand. The trees here shown are red pine. White and Scotch pine are doing equally well. Four-year transplants were most successful in planting.



A hedge of white and Scotch pine set out in pure sand as a protection to one of our plantations on the Cape. The trees were strong transplants when set. The Scotch and white pine have both proved a great success. The Scotch are leading the white pine in height growth, although the latter are doing well.



STOCK USED BY FORESTRY DEPARTMENT.

	SPE	CIES.		Class	Number.		
White pine, .				4-year transplants,			605,000
Scotch pine, .				4-year transplants,			270,000
Red pine, .				4-year transplants,			68,000
Spruce,				4-year transplants,			140,000
Austrian pine,	٠.			4-year transplants,			6,000
Total, .							1,089,000

STOCK SOLD TO PRIVATE OWNERS.

	S	PECI	ES.		Class.	Number	
White pine, .					4-year transplants,		278,000
White pine, .					5-year transplants,		40,775
Red pine, .					4-year transplants,		51,200
Scotch pine, .					5-year transplants,		14,200
Scotch pine, .					4-year transplants,		102,402
Spruce,					4-year transplants,		19,052
Arbor vitæ, .						-	4,500
Hemlock, .						-	1,700
Douglas fir, .						-	8,550
White pine, .					2-year seedlings,		10,000
Total, .							530,379

STOCK USED BY OTHER STATE DEPARTMENTS.

	S	PECI	ES.		C	Number.			
White pine,					5-year transplants	9			2,000
Scotch pine,					5-year transplants	,			2,000
Spruce, .					4-year transplants	,			1,000
Arbor vitæ,					-	-		-	1,000
Douglas fir,					_	-		-	1,000
White pine,					3-year seedlings,				250,000
Total,									257,000

INVENTORY OF NURSERY STOCK.

Sr	ECL	ES.			4-Year Transplants.	3-Year Transplants.	2-Year Seedlings.	1-Year Seedlings.
White pine,					830,000	1,740,000	925,000	350,000
Red pine, .					261,700	125,000	-	, -
Scotch pine,					50,000	330,000	350,000	32,500
Austrian pine,					22,000	-	-	-
Spruce, .					135,000	60,000	400,000	100,000
Ponderosa pine,				.•	25,000	-	-	-
Jack pine, .					_	140,000	-	190,000
Larch, .					10,000	-	2,000	3,600
Arbor vitæ,					_	_	-	45,000
Hemlock, .					_	-	4,000	9,600
Engelmann sprue	ce,				_	_	-	22,000
Douglas fir,					-	-		155,000
Totals, .					1,333,700	2,395,000	1,681,000	907,700

In addition to the above we have the following stock in the nurseries:—

White pine 3-year seedlings,					200,000
Spruce 5-year transplants, .					14,000
Arbor vitæ 7-year transplants,				. ^	11,200

BLISTER-RUST ERADICATION.

Through a co-operative agreement with the nursery inspector of the State Department of Agriculture it was decided to put on a crew of men during the summer in scouting certain of our plantations for wild currant and gooseberry in order to prevent the spread of pine blister rust. The plantations selected were those on which German-grown pines were set in 1909, and which therefore were known, or strongly suspected, to have trees infected with the blister. In 1914 these same lots were scouted for infected pines, but the ribes had not been removed. The nursery inspector bore three-fourths of the total cost of \$1,600. The following table gives the result of this eradication work. It will be noted that on some lots no currants whatever were found, while on others there were thousands, showing great irregularity in the distribution of these plants. The figures for infected pines mean little, as no attempt was made to examine them.

BLISTER-RUST ERADICATION.

T			Area	RIB	ES ERADICAT	red.	Infected	
Lor			examined.	Infected.	Not infected.	Total.	Pine.	
Templeton, .			55	-	887	887	1	
Davis,			152	-	51	51	-	
Lamb,			48	-	-	-	-	
Bent,			58	-	8,553	8,553	-	
Fenno 1 and 14,			110	16	52	68	-	
Fenno 2,			128	-	10	10	-	
Whitney,			147	170	2,030	2,200	13	
Fenno 15,			77	-	171	171		
Heywood,			189	3,210	50,982	54,192	2	
Lynde,			108	2	398	400	-	
Derby,			26	-	-	-	_	
Smith,			96	_	55	55	-	
Totals,		٠	1,194	3,398	63,189	66,587	16	

EXAMINATIONS.

The number of applications for examination of private woodlands and trees was far less than the number of the previous year, — smaller, in fact, than for many years. There is no doubt that the high price of common labor is a great detriment to the practice of forestry, and most woodland owners are very much inclined to postpone any work that will not give an immediate profit.

LIST OF EXAMINATIONS BY SUBJECTS.

			Sv	BJEC	г.			Number.	Acres.
Thinning, .								16	897
Thinning and p	lantii	ng,						5	215
Planting, .								5	1,062
Estimate, .								8	556
Chestnut blight	thin	ning	, .					2	200
Insects and dise	eases,							1	50
Cutting, .								1	220
General, .								3	976
Totals, .								41	4,176

TREE PLANTING IN 1919.

A total of 787,379 trees of white, Scotch and red pine, with a few thousand of other varieties, was planted in the spring of 1919. This stock was sold to the public from our nurseries at an average price of \$8 per thousand or furnished to other State departments free of charge.

These trees were distributed throughout the State among the following 80 towns and cities:—

Acushnet,		50,000	Hubbardston,			1,000
Amesbury,		2,000	Hudson, .			26,100
Amherst,		2,100	Huntington,			5,000
Andover,		13,000	Hyde Park,			1,500
Ashland,		3,000	Lancaster, .			1,000
Ayer,		7,000	Leominster,			12,000
Barnstable, .		3,000	Lowell, .			12,000
Barre,		1,000	Lynn,			31,000
Beverly,		7,000	Marlborough,			4,250
Boston,		5,000	Mattapan, .		. 1	50,000
Boxford,		11,000	Mattapoisett,			1,000
Brockton,		3,350	Maynard, .			2,000
Cambridge, .		. 100	Millbury, .			1,000
Carlisle,		4,000	Milton, .			1,000
Charlemont, .		5,000	Nantucket,			1,500
Chatham,		450	Newton, .			14,500
Clinton,		300	North Attlebor			16,000
Cohasset,		1,000	Northampton,			48,000
Concord,		3,000	Norwell, .			9,500
Danvers,		3,000	Oak Bluffs,			1,000
Dover,		23,000	Orange, .			1,000
Edgartown, .		1,500	Palmer, .			2,000
Falmouth,		5,000	Pittsheld, .			300
Fitchburg,		41,000	Plymouth, .			1,900
Foxborough, .		1,100	Princeton, .			1,000
Framingham, .		1,000	Raynham, .			5,000
Gardner,		1,000	Rutland, .			1,000
Granby,		2,300	Sherborn, .			3,000
Great Barrington,		10,250	Shrewsbury,			1,150
Greenwich, .		1,550	Southborough,		. 1	.00,000
Groton,		3,000	Southwick, .			4,000
Hadley,		2,000	Sudbury, .			3,000
Harvard,		10,000	Topsfield, .			1,000
Holyoke,		10,000	Waltham, .			6,000





One of the four horse-power sprayers loaded on a Ford truck. This is a very convenient and handy spraying outfit for general use and a popular one with moth superintendents.



A country roadside properly thinned and cared for as regards moth work, convenience of travel, forest-fire dangers and æsthetic beauty.

Wareham,		36,200	Winchendon,		1,000
Warren,		1,000	Winchester,		15,000
West Boylston, .		2,000	Woburn, .		200
West Brookfield,		79	Worcester, .		500
Westborough, .		3,000	Wrentham,		200
Westford,		2,000	Yarmouth, .		1,000

The species sold were distributed as follows: -

White pine,		580,775	Hemlock, .			1,700
Red pine, .		51,200	Arbor vitæ,			5,500
Scotch pine,		118,602			-	
Douglas fir,		9,550	Total, .			787,379
Norway spruce,		20,052				

GYPSY MOTH SPRAYING WORK.

During the past year our spraying equipment has been greatly augmented by new outfits in various cities and towns. Almost all of our towns and cities that have large shade trees and woodlands have purchased at least one high-power sprayer, while many have more than one. A sprayer that is very practical and convenient is the so-called "four-horse," which can be carried about on a Ford truck or one-horse wagon, and has good power. This sprayer covers trees of ordinary height, and the ease with which it is transported makes it a fine auxiliary to the large sprayer. On the Cape it has become the most popular of any. Besides its use with trees it is a convenient size for spraying the cranberry bogs. The fact that for the same expenditure of money a town can secure at least three of these small sprayers instead of one large one, that they can be manned by a much smaller crew, and that all three can be working in different parts of the town at the same time are points in their favor which tend to popularize their use. They also are well adapted for spraying orchards and for private work in general. As there has been a great tendency for the moth superintendents to do this work, this equipment serves that purpose well. The ideal arrangement in the ordinary town is to depend upon the larger standard sprayer for the State highways and thickly settled residential sections, where the trees are usually very tall, like the elms, while other work may be handled by the four-horsepower sprayer. Generally speaking, it will require the constant

use of the high-power standard sprayer to cover the streets alone, for most towns have a very large mileage.

We are of the opinion that the time is rapidly coming when spraying and creosoting the egg-clusters in alternate years will be the practical method. In this case each can be done more thoroughly. This plan, it is believed, should be considered in the towns that have been infested for some time. We are satisfied that spraying with arsenate of lead is the most satisfactory way to combat the gypsy moth. When it is recognized that these same sprayers are of equal importance in spraying other insects and diseases which are bound to appear occasionally, they become a good investment. There is no section in America, after all, where better and more intelligent care is given to trees than here in Massachusetts, and this fact is due to the careful study and highly developed equipment that has resulted from our necessary struggle to suppress the gypsy and brown-tail moths. The motor-truck sprayers have not been alluded to, as these are more expensive, and while they are well adapted to the State highway work, and to some of the wealthier towns and cities, it is questionable as to just how practical they are for general use. It is only a matter of time when a smaller and more convenient type of power-truck sprayer will be perfected. it is believed.

Dry v. Paste Arsenate of Lead.

During the past season we concluded to use the dry or powdered form of arsenate of lead on a much larger scale than heretofore. Our contracts, therefore, were placed for about one-half each of the dry and the paste lead. The plan was also carried out of furnishing the towns and cities with about equal amounts of each ingredient. As a result of this experiment we have become assured that the dry or powdered form is greatly preferred. It has been greatly perfected by the manufacturers during recent years and the standard brands now being offered by reputable companies are very reliable. The dry form is far less bulky, and hence easier to handle and more convenient. Manufacturers are putting the dry lead up in small packages of just the right amount for charging our standard spraying tanks, and this is far more convenient than the old method of

weighing out the required amount from a barrel of paste lead. It is also proving more economical, as there is far less waste, and the amount used is more uniform. We are so well pleased with the dry lead that it will probably supplant the paste form in the near future if not the coming season.

MOTH THINNING AND UTILIZATION WORK.

During the past year the work of operating in co-operation with private individuals, either for the amelioration of gypsymoth conditions or to help in proper forest management, has progressed in all sections of the State. A list of the operations on which work was done during the past year is appended. On these operations about 3,000 cords of wood were cut and about 1,400,000 feet of lumber. About \$42,000 of capital, supplied by private individuals, were expended in carrying on the operations. They were all of the type where the returns are in excess of the amount of capital expended, and should all lead to a profit, many of them to a substantial one. The work has not gone on as fast as was anticipated at the beginning of the year, due to the great difficulty in obtaining labor. Also the transition period between war and peace has made it inadvisable to do too much, especially in the line of producing cordwood, the market for which is still very uncertain. For that reason a number of operations that might otherwise have been carried on have been postponed to some future time. A number of changes in the personnel of that branch of the work have also hindered its efficiency. It is hard to obtain men capable of carrying on practical operations and compete in wages against the many openings which are offered by private business.

Twenty-five formal examinations of woodland were made during the year, covering about 3,800 acres. Besides that a large number of informal examinations were made where only part of the area was examined or special advice only was asked.

Five different meetings were addressed during the year, where talks were made on the subject of operating along forestry lines or the utilization of forest products. A bulletin is in preparation on the subject of portable sawmills operating in Massachusetts.

OPERATIONS.

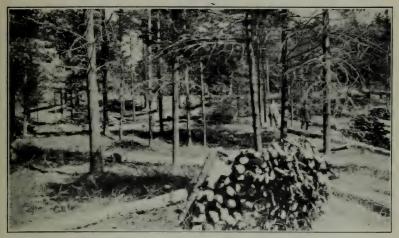
OWNER			Location		Area (Acres).	Character.
Francis R. Bangs,			Wareham, .		40	Cordwood and planting.
H. W. Bennett, .			Marion, .		100	Wood machine.
D. C. Brewer, .			Harvard, .		130	Sawmill and cordwood.
E. F. Greene, .			Wayland, .		110	Sawmill and cordwood.
J. W. Helburn, .			Housatonic,		70	Sawmill and cordwood.
R. M. Johnson, .			Andover, .		10	Planting,
J. E. Maynard, .			Harvard, .		16	Sawmill.
Sharon Sanatorium,			Sharon, .		90	Sawmill and cordwood.
Joseph Skinner, .	٠	٠	Hadley, .		50	Planting.

MINOR WOODLAND OPERATIONS.

In the eastern part of the State there are innumerable small tracts of woodlands which, due to gypsy-moth infestation, forest fires, chestnut blight, etc., need attention. During the past year very strenuous efforts were put forth to give object-lessons in solving this problem. Whenever tracts could be obtained and the owners interested it was undertaken, provided the operation was along a well-traveled road or in a conspicuous place. The idea at all times was to show, through a practical demonstration, how these woodlands may be treated so as to derive the most out of them at the present time, and leave them in a condition for producing maximum crops of superior value in the future.

In addition to the utilization methods commonly practiced heretofore of cutting into lumber, ties, poles and cordwood, a portable circular-saw equipment capable of receiving sticks of wood of long or unequal lengths, and thus converting them into stove or furnace sizes in one concerted action in the woodland itself, has been the means of aiding in making this work practical and effective.

This equipment has come into use when cordwood choppers are scarce, and by cutting in full lengths the few skilled choppers were thus used to great advantage. Another condition has also prevailed that has been favorable, in that coal was short and



A gypsy moth forest thinning, showing the logs and cordwood removed. The white pine stand remaining will be immune from the moths. This operation was carried on in the town of Burlington on the Simonds estate.



The product of one town's portable circular saw outfit in Lunenburg. Cut into these short lengths it meets a popular demand. The owner was able to dispose of his whole product of about a thousand cords on the lot.



the demand for 12 and 16 inch fuel wood was very general. Many of these operations sold the entire product on the lot, so eager were purchasers to secure it.

Operations were carried on in the towns and one city as listed below: —

		PLAC	Œ.			Number of Operations.	Acres.	Cords of Wood.
Bedford,					ĺ.	1	20	125
Bolton, .						1	6	45
Burlington,						1	30	60
Chelmsford,						3	35	75
Fitchburg,						1	30	150
Groton,						4	70	180
Harvard,					٠.	1	45	80
Lunenburg,						2	80	1,000
Pepperell,						2	20	70
Sudbury,						2	15	90
Tyngsborou	gh,					1	40	150
Waltham,						1	40	208
Total,						20	431	2,233

Woodland operations of like character took place in Marlborough, Sherborn, Dunstable, Hudson and Framingham, under our supervision, with a total of over 1,000 cords, but without the use of sawing equipment.

A municipal plant was installed at the advice of the State Forester in the city of Boston. Superintendent Long has, besides two circular-saw outfits, a permanent sawmill. This arrangement allows him to utilize all of the small trees and limbs for fuel wood, and the larger trees for lumber.

GYPSY-MOTH WORK IN PROTECTING CRANBERRY BOGS.

Co-operative work with the cranberry growers has continued through the year. In fact, the Cape Cod Cranberry Growers' Association complimented the department by electing the State Forester's representative in charge of the work in that division of the State, Mr. Walter F. Holmes, as a member of their executive committee. The seriousness and importance of this

work should not be overlooked, for this industry is far more important than most people realize. The following report, which was written by Mr. Holmes, was sent in with the approval of Pres. James T. Hennessy of the above-named association:—

Previous to 1918 bog work centered mostly in the town of Carver, with a small amount of work done in Mashpee and Harwich. Since then we have extended cutting operations into Pembroke, Kingston, Duxbury, Plymouth, Lakeville, Rochester, Bourne, Falmouth, Mashpee, Barnstable and Plympton, with spraying operations so extended as to include all towns in which cranberry bogs are located.

Mr. J. Myrick Bump, chairman of the Cape Cod Cranberry Growers' Committee, has been of especial assistance to us through his knowledge of bog conditions and the splendid co-operation of his committee.

Recently Dr. Franklin of the State Experimental Cranberry Station has offered his services in connection with this work to our local moth superintendents; also he will conduct a special field service to co-operate with our work during the caterpillar season. We are planning to hold meetings at Plymouth and Buzzard's Bay early in January, and field meetings during the month of May.

There is no doubt but that the gypsy moth has become a serious menace to the cranberry industry. The great majority of cranberry growers do not know how to combat it, and until recently were unable to carry on spraying operations through lack of proper equipment. This is being overcome at the present time, I am happy to say, and our personal efforts to instruct the individual grower as to his duty should be of everlasting benefit to all concerned.

We especially call to the attention of the towns in which cranberry bogs are located the importance of this industry to the community, and urgently request that proper spraying equipment be provided whereby this work may be done at a reasonable expense; also we would suggest to all growers who have fifteen or more acres under cultivation the desirability of owning their own spraying equipment.

THE STATE FIRE WARDEN'S REPORT.

Mr. F. W. Rane, State Forester.

Sir: — In compliance with your request, and in accord with the provisions of chapter 722, section 2, Acts of 1911, I beg to submit the following report of the work accomplished by this branch of the department this year.

The fire season in general has been a very favorable one. While we experienced unfavorable conditions from April 20 to May 20, when we had nearly 900 fires, the damage from these fires was very low compared with other years, this being undoubtedly due to our observation system,

which is nearing completion, to the stronger forest fire organization that has been built up in towns by our district forest wardens, together with the assistance rendered by the district forest wardens in furnishing extra supplies of forest fire equipment where necessary. This extra equipment is carried by this department for use in emergency cases, such as large fires that have gone beyond control, or for use in small towns that have as yet been unable to procure even a small amount of forest fire fighting equipment to enable them to handle their fires. This department is equipped now with two complete forest fire outfits, one located in Westborough and one in Westfield. Both outfits are equipped with motors, and are sufficient for any ordinary fire. We hope that we shall soon be able to have apparatus of this kind for use in Plymouth and Barnstable counties. While most of the Cape towns are very well equipped for handling their forest fires, at the same time, special motor equipment of this nature could be centralized at the Myles Standish State Reservation, thus giving the reservation additional protection, and be available for use throughout the two counties.

We have had in operation this season 36 fire observation stations, from which more than 1,400 fires have been observed and reported. These stations are equipped with topographical maps, alidades, powerful field glasses and telephones, which enable the observers to report with promptness and accuracy to the forest wardens or deputies the location of the fires.

We purchased this year the summit of Mount Grace, Warwick, and replaced the windmill tower which has been in use there for seven years with a large 8-ton steel tower, 70 feet high, with stairs, and a 10 by 10 foot room at the top. The station has always been a very important one, and with the new tower giving additional height overlooks thousands of acres of forested area in Massachusetts, as well as a large amount of territory in New Hampshire. The towns of Athol, Erving, Northfield, Orange, Royalston and Warwick contributed \$900 towards the cost of this station.

The old windmill tower, formerly in use at Chelmsford, and replaced last year with a 70-foot steel tower, has been erected on the Myles Standish Reservation. An addition of 10 feet was made to it, and it now forms a part of the protective system of the reservation. The exterior of the Falmouth, Waltham, Westborough and Chester towers and the interior of nearly one-half of the towers in the State were painted. The new tower at Chester, which was not entirely completed last year, was finished and in operation a portion of this year.

The roads leading to many of the observation stations have been improved, so it is now possible to drive by automobile to them. This has increased the number of visitors, so that over 13,000 pleasure seekers coming from not only Massachusetts, but representing nearly every State in the Union and several foreign countries, have visited them.

A new forest fire truck was purchased and is centrally located at West-

borough. This is used for forest fire work during the fire season, and on construction work during the balance of the year.

Forest warden conferences were held during the months of February and March in the following places: Barnstable, Fall River, Middleborough, Salem, Lowell, Greenfield, Worcester, Springfield, Gardner and Northampton. These meetings were well attended by forest wardens. deputies and selectmen, and a great deal of interest was shown in the following discussions: the necessity of providing towns with better forest fire fighting equipment; instructions to wardens and deputies as to the best methods of handling extinguishers, pumps and other equipment at fires in order to accomplish the best results; the enforcement of the forest fire laws; the importance of promptly reporting all fires to this department; and railroad fires, with instructions as to how to make out railroad fire pay rolls in order that towns may be reimbursed promptly for money expended in extinguishing them. The railroads were represented by the following claim agents: Boston & Maine, E. A. Ryder: New York, New Haven & Hartford, C. B. Rood; Boston & Albany, C. C. Cone; and the Central Vermont, Mr. Goodell. Owing to the interest shown in and good results from these meetings, it seems desirable to continue them again this year.

We have had 549 railroad fires during the season, as follows: Boston & Albany, 107; Boston & Maine, 48; Central Vermont, 8; New York, New Haven & Hartford, 386. These fires burned over an area of 3,242 acres, causing a damage of \$13,319, and costing to extinguish, \$4,871. This is the lowest railroad fire damage we have had in several years. Over 700 locomotives have been examined by the department, and while some serious defects have been found, especially in locomotives running on branch lines, most of the defects have been minor, and promptly repaired.

The question of adequate fire protection for our State-owned reservations is a matter that must receive serious consideration. We have now five State reservations comprising over 12,000 acres, and with the exception of the Myles Standish Reservation of 7,000 acres, in the towns of Plymouth and Carver, very little work has been done along this line. Around the entire reservation a narrow fire line has been made, roads have been bushed out and some fire lines made inside the reservation. A small amount of forest fire fighting equipment is also kept here for use.

If the State is to continue its policy of reforesting this reservation, more adequate fire protection must be provided. The fire line around the entire tract must be widened, making it especially wide on the southern and western sides. Inside the reservation, and especially where we have extensive plantations, the territory should be divided into a relatively small area of from 300 to 500 acres in extent by wide fire lines. These fire lines should be made along the present roads by widening out the existent lines. Then, by providing additional forest fire fighting equipment, with one or two small motor trucks for transportation, we shall be able to confine a fire to a given area.

The Forest Commission during the year established the policy of leasing camp sites around the several ponds, which means that probably 120 sites will be leased on this reservation by June 1 next. This of course adds to the fire danger by bringing in possibly 500 pleasure seekers. On the other hand, it gives us a surplus of help to draw from in case of fire. Wide fire lines should be constructed around these camp lot ponds, and also along the roads leading to the ponds. These fire lines would of course serve two purposes, — the protection of the campers from fires coming on to the reservation, and the protection of the reservation from fires coming from camp site owners. The original cost of construction will vary with the amount and character of the growth to be cleared, but the expense of maintenance should be very low.

The revenue received from camp sites, which will be about \$1,200 per year on this reservation alone, could be reappropriated each year, thereby providing funds which we believe will be ample for maintaining the fire lines on this reservation after they are once installed.

The fire conditions on the other reservations are very different; there is very little fire risk at present, and the possibility of leasing a large number of camp sites is not so promising, owing to the lack of ponds and ideal conditions for campers. We are, however, reforesting considerable territory on each reservation, and ample precautions should be taken by constructing fire lines around these plantations and providing sufficient equipment for extinguishing any fires that may occur.

It seems advisable that a fire observation station be established on the summit of Proven Mountain, which is located on the town line between Agawam and Westfield, on land owned by the city of Springfield. We have endeavored in the past to protect the towns in this locality from our station at Mount Tom, but have been unable to get to fires promptly enough to be of distinct advantage to the towns. This is an extremely dangerous fire section, and a station here would lessen the fire danger very materially. An extension should be added to the fire tower located at Hanson. The present tower is 48 feet high and was erected six years ago. The growth around this station has been so rapid that the view is somewhat obstructed on two sides, and a 20-foot extension is desirable.

Many of the towns, especially in the eastern part of the State, now own motor equipment, which enables the wardens to get to fires quickly, and to extinguish them before any serious damage has been caused. Throughout the central and western part of the State conditions are different. The towns are not as well-to-do, and it is extremely difficult to convince the town authorities of the importance of supplying their wardens with equipment, and better protecting their forested area.

As a large percentage of our woodland lies throughout this locality and within the poorer towns, it is certain, if this timberland is to receive proper protection, the State must assist them in addition to reimbursing them 50 per cent of the cost of the forest fire fighting equipment, and must assume some of the expense caused in extinguishing fires. All of the New

England States, with the exception of Massachusetts and Rhode Island, assume a portion of the forest fire fighting expense throughout their forested towns, and until such time as Massachusetts comes to the assistance of these smaller towns this forested area will not receive the protection it deserves.

We called attention in the last annual report to the unsatisfactory results accomplished in the enforcement of our present slash law, and endeavored through the General Court to have this law amended, but were unsuccessful. We are not getting results under the present law, and will not until this department can assume some authority in the enforcement of it. It seems advisable that another effort be made to amend this act, giving a clearer conception of what is required, and placing the responsibility of its enforcement with this department.

The law requires that forest wardens shall be appointed by the selectmen during the month of January. As many selectmen fail to make this appointment at this time, and frequently it goes over until after the annual town meeting, it seems necessary that the law be amended authorizing the State Forester to make such appointment in all cases where it is not made by the selectmen during the month of January. The reason for this is there is not sufficient time to complete our town fire fighting organization before the personnel of the force is needed at our observation stations.

Again this season we have had the hearty co-operation of the Blue Hills Meteorological Bureau. We find it a distinct advantage, especially during a drought, to be able at a moment's notice to get valuable weather forecasts which we can transmit to our observer, as so much depends, not only upon when rain is expected, but also upon wind direction and velocity, all of which play an important part in extinguishing forest fires.

The usual large number of permits for burning brush and rubbish have been granted. During the early spring several arrests were made of parties violating the permit law, some of whom were convicted and fined, while others were allowed to settle by paying for the cost of extinguishing.

Over 8,000 cloth fire notices were distributed throughout the Commonwealth. These were posted by the town forest wardens and our district men in country stores, railroad stations, camp grounds, along streams and in other conspicuous places.

We have co-operated again this year with the Federal department under the Weeks law, and were allotted \$3,052, to be expended in salaries of observers. This has enabled us to carry nine men for the entire season on the Federal pay roll. Owing to the increase in salaries which must be paid to observers, it is necessary that a larger amount be allotted for this coming year.

Respectfully submitted,

M. C. Hutchins, State Fire Warden.

Towns receiving Fire-equipment Reimbursement during 1919.

Avon, .			\$28	78	New Salem,			\$57	00
Belchertown	١,		18	00	Orleans,			60	30
Bellingham,			30	63	Otis, .			75	00
Boxford,			3	00	Peru, .			19	50
Erving,			37	50	Washington,			21	75
Gosnold,			125	00			-		
Halifax,			8	00	Total,			\$498	46
Montgomer	17		14	00					

COMPARATIVE DAMAGES BY FOREST FIRES FOR THE PAST TEN YEARS.

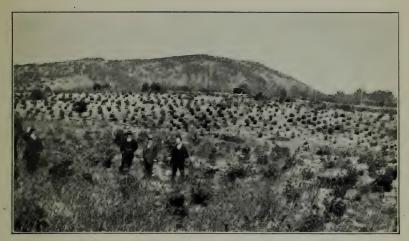
	YE	AR.		Number of Fires.	Acreage burned.	Cost to extin- guish.	Damage.	Average Acreage per Fire.	Average Damage per Fire.
1910, .				1,385	42,221	\$23,475	\$205,383	30.46	\$148 20
1911, .				2,356	99,693	47,093	537,749	39.31	226 24
1912, .				1,851	22,072	20,219	80,834	11.92	43 67
1913, .				2,688	53,826	35,456	178,357	20.02	66 35
1914, .				3,181	38,975	48,750	95,389	12.25	29 98
1915, .				3,008	48,389	36,783	141,073	16.08	46 90
1916, .				1,425	16,198	8,593	44,765	13.22	36 54
1917, .				2,175	20,020	18,033	41,109	9.21	18 90
1918, .				2,553	37,638	28,043	205,627	14.74	80 05
1919, .				1,566	22,045	17,388	49,069	14.07	31 32

Types of Classified Damages.

				1915.	1916.	1917.	1918.	1919.
Standing trees,				\$73,782	\$18,786	\$24,705	\$71,706	\$16,595
Logs, lumber, co	ordw	ood,		23,544	4,545	4,680	37,815	7,516
Buildings, .				31,904	10,823	6,893	46,025	12,508
Bridges, fences,				1,936	1,638	687	1,742	902
Not classified,				9,907	8,973	4,144	48,339	11,548
Totals, .	٠			\$141,073	\$44,765	\$41,109	\$205,627	\$49,069

CLASSIFIED CAUSES OF FOREST FIRES, 1914-19.

	19	1914.	1915.	.51	1916.	.91	19	1917.	19	1918.	19	1919.
	Number.	Number. Per Cent. Number. Per Cent.	Number.	Per Cent.	Number.	Number. Per Cent.	Number.	Number. Per Cent.		Number. Per Cent.	Number.	Per Cent.
Unknown,	1,174	37.0	1,134	37.7	301	30.8	634	29.3	926	36.2	499	31.8
Railroad,	830	26.0	777	25.8	412	42.1	800	36.8	662	31.2	549	. 35.1
Burning brush,	196	6.2	439	14.5	79	8.1	262	12.0	300	11.7	204	13.0
Hunters, smokers, .	520	16.4	129	4.2	111	11.3	224	10.3	237	9.2	178	11.4
Sawmills,	က	1.	10	1.	2	6.	7.0	2.	14	9.	ಸಂ	e.j
Children,	140	4.4	191	5.3	35	3.6	133	6.1	166	6.4	19	3.9
Miscellaneous, .	318	9.9	363	12.4	38	3.9	117	5.4	111	4.7	20	4.5
Totals,	3,181	100.0	3,008	100.0	826	100.0	2,175	100.0	2,553	0.001	1,566	100.0



A portion of a 300-acre plantation made by the department in Ashburnham. The trees have been set four years. Watatic Mountain is seen in the background, upon which is located one of our steel forest fire lookout stations.



This is a large area of scrub oak land on the Cape, that has been planted with four-year transplants of white and red pine. The trees are set in the open spaces between the oak sprouts. This is believed to be the solution of reclaiming much of this waste land. In a few years the pine will overpower the oak and claim the whole area.

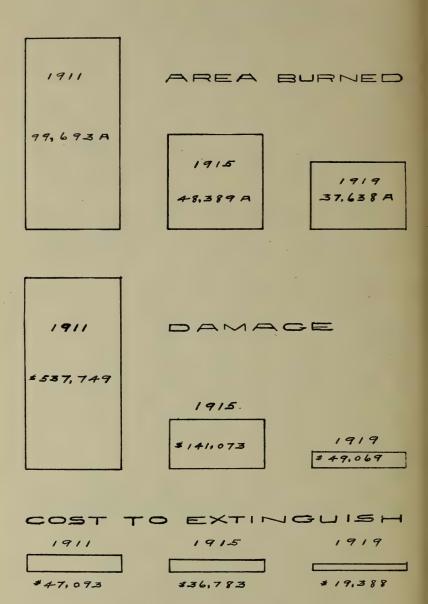


Types of Land burned over (Acres).

					į	1915.	1916.	1917.	1918.	1919.
Timber, .	0					3,817	1,435	1,237	2,520	1,659
Second growth,		•1				6,749	755	2,274	5,696	2,502
Second growth,	not	merc	hant	able,		9,107	1,970	4,137	6,069	2,893
Brush land,						14,681	9,990	7,126	10,549	11,122
Grass land, .					.	8,128	1,573	3,814	4,669	3,671
Not classified,						5,907	475	1,432	8,135	198
Totals, .					. 1	48,389	16,198	20,020	37,638	22,045

Forest Fires of 1919.

		Mon	н.			Number.	Acres.	Cost to extinguish.	Damage.
		1918							
December,						9	13	\$40	\$5
		1919	•						
January,	•	•		• _	٠,	37	104	145	-
February,						253	1,291	1,465	5,167
March,						255	3,346	2,403	5,625
April, .						455	6,217	4,666	15,497
May, .						302	6,658	4,804	10,890
June, .						110	764	1,537	6,023
July, .						77	1,273	1,616	1,784
August,						31	2,215	534	1,473
September,						6	3	28	-
October,						11	7	24	2,525
November,						20	154	126	80
Totals,						1,566	22,045	\$17,388	\$49,069



LECTURES AND ADDRESSES.

The following is a list of lectures and addresses delivered by the State Forester and his assistants during the year 1919:—

Massachusetts Tree Wardens' and Foresters' Association.

Springfield Forest Fire Conference.

Men's Club, Second Church, Dorchester.

Twentieth Century Club.

Abington Woman's Club.

Westborough Grange.

Mount Grace Reservation meeting (Warwick).

Parish House Brotherhood Club (Ipswich).

Massachusetts Fire Chiefs meeting.

Eastern Foresters' Association (Kineo, Me.).

North Shore Forestry Association (2).

Cape Cod Cranberry Association.

Society for the Protection of New Hampshire Forests (Bethlehem, N. H.)

Eastern Shook and Wooden Box Association.

State meeting of moth superintendents.

Soldiers' land public meeting (Springfield).

Society for Promotion of Agricultural Science (Baltimore, Md.).

Western New York Horticultural Society meeting.

Lawrence Chamber of Commerce.

Wholesale Dry Goods Association.

Massachusetts Agricultural Club.

New England Nurserymen's Association.

Association of Eastern Foresters (New York City).

Waltham Grange.

Northampton Chamber of Commerce.

Boston Market Gardeners' Association.

Massachusetts State Board of Agriculture.

Massachusetts Horticultural Society. New England Forestry Congress.

Rockland Men's Club.

Marlborough Board of Trade.

Manchester citizens meeting.

Pembroke Grange.

Mayflower Pomona Grange.

STATE HIGHWAY WORK.

The spraying of the State highways has been done as usual under the direction of this department by the local organizations in the towns or the traveling sprayers owned by the State, and some creosoting was also done where it was deemed economical. The cost of the work was \$9,991.05, and it included work in 111 municipalities.

THE DISTRIBUTION OF SUPPLIES.

Supplies, including arsenate of lead and hose, have been furnished to towns and cities doing gypsy-moth work, as usual. The amounts given in the list below do not always correspond exactly with the aid given the towns, as some towns make payments to the State for all or a part of the bill for supplies, according to the amount of their net expenditure or their class, under the provisions of chapter 381, Acts of 1905.

For amounts received from this office in reimbursement and for expenditures, see table on page 43.

List of Cities and Towns and Amounts of Supplies furnished for 1919.

Acton, .	٠	•	•	\$825 13	Duxbury, .	•		\$1,364 41
Andover,	٠	•		90	East Bridgewater,	•		806 83
Ashburnham,	٠	•	:	241 03	Easton,		• 1	
Ashby, .				430 00	Essex,			301 77
Ashland, .				539 70	Falmouth, .			1,419 92
Avon, .				163 20	Foxborough, .			1,840 43
Ayer, .				407 70	Freetown, .	• ,		113 50
Bedford, .				858 15	Georgetown, .			1,103 26
Berlin, .				419 64	Groton,			865 27
Billerica,	,			16 81	Groveland, .			364 68
Bolton, .				1,050 19	Halifax,	,		557 27
Bourne, .				1,143 39	Hamilton, .			757 20
Boxborough,				708 77	Hanover, .			2,297 18
Boxford, .				686 94	Hanson, .			490 99
Boylston,				354 16	Harvard,			1,334 59
Brewster,				955 61 1	Harwich,		•,	2,399 26
Bridgewater,				1,384 13	Holbrook, .			536 30
Burlington,				813 94	Holden,			1,003 47
Canton, .				3,761 74	Holliston, .			1,229 49
Carlisle, .				1,331 76 1	Hopkinton, .			170 98
Carver, .				2,691 50	Hudson,			6 81
Chelmsford,				887 03	Ipswich,			1,478 09
Danvers,				5 90	Kingston, .			604 52
Dedham,				39 00	Lakeville, .			932 83
Dennis, .				260 99	Lexington, .			100 36
Dover, .				2,214 83	Lincoln,			2,322 17
Dracut, .				1,294 27	Littleton,			887 83
Dunstable,				356 00	Lunenburg, .			1,732 33

¹ This includes cost of sprayer,

LIST OF CITIES AND TOWNS AND AMOUNTS OF SUPPLIES FURNISHED FOR 1919 — Concluded.

Lynnfield.				\$ 945 (67	Sherborn,				\$ 589	52
Mansfield,		•	•	16		Shirley.	•	•	• •	576	
Marion,				1,482 8		Shrewsbury,				567	
Marshfield.				2,228		Southborough,	•		:	1,367	
Mashpee,			-	1.164		Sterling				499	
Medfield.				2.115 3		Stoneham.		Ĭ		844	
Merrimac.				162 8	88	Stoughton,				1,101	47
Middleboroug	h.			1,795 8	81	Stow, .				861	
Middleton,				449 2	21	Sudbury,				893	48
Needham,				78 (00	Templeton,				251	91
Newbury,	•			1,128	18	Tewksbury,				905	72
Norfolk, .				280 3	39	Topsfield,				256	87
North Andove	r,			1,351)9	Townsend,				585	58
North Reading	g,			1,282 2	241	Truro, .				174	52
Northborough	,			824 2	22	Tyngsborough,				1,293	87
Norton, .				497 4	13	Walpole, .				78	00
Norwell, .				1,058 8	39	Waltham,				20	04
Orleans, .				921 1	l3 ¹	Wayland,				1,068	61
Pembroke,				2,260 8	36	Wellfleet,				411	31
Pepperell,				1,040 6	88	Wenham,				566	06
Plainville,				462 ()5	West Boylston	,			521	61
Plympton,				420 1	14	West Bridgewa	ter,			1,400	311
Princeton,				816 2	20	West Newbury	,			514	93
Raynham,				804 1		Westborough,				568	
Reading,				36 9	_	Westford,				1,259	
Rehoboth,				181 6	60	Westminster,				282	92
Rochester,				385 2	28	Weston, .				2,189	
Rockport,				2 5		Westport,				78	00
Rowley, .				663 8		Wilmington,				1,370	
Salisbury,				665 2		Winchendon,				460	
Sandwich,			•	1,002 8		Wrentham,				11	
Saugus, .				450 0		Yarmouth,				1,175	82 1
Scituate, .				2,587 5	_						
Sharon, .				20 9	9				\$10	04,965	82

¹ This includes cost of sprayer.

State Forest Commission	n,			• ,						\$14	55
Forestry and nurseries,										2	50
Purchase and planting of	of fores	t la	nds,				۰	. •		10	80
Prevention of forest fire	s,									128	47
Special North Shore fun	d,							٠.	۰	3,403	26
Thinning work, .										50	13
Travelling sprayer,	or .		`*							3	15
Dover woodland work,										42	60
Massachusetts Highway	Comr	niss	ion,		•	•				1,862	10

\$16 45

FINANCIAL STATEMENTS.

GENERAL FORESTRY AND NURSERIES.

	Re	eceip	ts.					
Appropriation for 1919, .							\$20,850	00
	Expe	endit	ures.					
General: —								
Pay roll,					\$4,186	00		
Travel,					4,030	84		-
Printing,					193	77		
Postage, books, etc.,					22	07		
Supplies and equipment .			•		230	91		
Express, teaming and telepho	ne,				227	42		
. ,								
Nursery: —								
D 11 .					9,988	70		
Seed						. 11		
Supplies and equipment, .					476	09		
Express and teaming,					660	02		
Sundries,			-			35		
,				_			20,849	28
Balance returned to treas	733.9977	Morr	20 1	1010			\$0	79
Dalance lettined to treas	sury 1	LYOV.	30, .	1919,		•	Φυ	12
Purchase and	PLAN	TIN	3 OF	For	EST LA	NDS.		
	D.	•	4.0					
4	N	eceip	is.				010.000	00
Appropriation for 1919, .	•	•	•	٠		•	\$10,000	00
	Expe	endit	ures.					
Pay roll,					\$8,786	30		
Travel,						33		
Supplies and equipment, .			. `		192	03		
Express, freight and teaming,					296	64		
Seed,					423	75		
Sundries,						50		
							9,983	
							0,000	55
							9,900	55

Balance returned to treasury Nov. 30, 1919, . . .

PREVENTION OF FOREST FIRES.

	R	eceipt	8.				
Appropriation for 1919,							\$36,000 00
	Exp	endit	ures.				
Salaries,	2.cp.				\$ 21,333	00	
Travel,					5,574		
Printing,					474		
Sundries and supplies, .					344		
Equipment,					1,839		
Construction,					3,196		
Teams, freight and express,					89		
Telephone,					877	69	
Town supplies,					1,305		
Truck expenses,					171		
Rent and purchase of land,						00	
Trent and parenase or mad,	•	۰	•				35,998 73
Balance returned to treas	surv	Nov	30	1919			\$1 27
Datalice Tevarior to treat	sury.	1101.	00,	1010,		•	91 21
0	FFICE	SIT	ADIT	26			
· ·	FFICE	i DAI	MILL	210.			
	R	eceip	ts.				
Appropriation for 1919,							\$7,300 00
	Exp	endit	ures.				
Salaries,							7,254 58
•							
Balance returned to treas	sury	Nov.	30,	1919,			\$45 42
Off	FICE	Incn	ENT	ALS.			
	R	eceip	ts.				
Appropriation for 1919,							\$5,000 00
	Exp	endit	ures.				
Travel,					\$1,478	11	
Printing,					877	10	
Stationery and postage, .					925	33	
Stationery and office supplies					576	89	
Maps, books and photograph						64	
Educational work,						20	
Sundries (including telephone			٠	٠		17	
bundries (including telephone	1), .	٠	•	•	316	. 11	A 547 A4
				-			4,547 44
Balance returned to trea	0113977	Vor	30	1010			\$452 56

Suppression of Gypsy and Brown-tail Moths.

Receipts.		
	\$83,749 4	16
Less reimbursement paid for 1918,	26,262 9	
Balance for 1919 work,	\$57,486 4	18
Appropriation for 1919,	225,000 (
Receipts credited to appropriation: —		
State Forest Commission, \$21 30		
General forestry and nurseries,		
General forestry and nurseries,		
Glidden Company,		
1.07	843 (06
	\$283,329	54
Expenditures.		
Pay roll,		
Travel,		
Supplies,		
Rent of store,		
Store equipment,		
Special work,		
Town pay rolls,		
Reimbursements,		
Thinning work,		
Printing,		
Stationery and postage,		
Teaming, repairs, etc.,		
Teaming, Tepans, eve.,	209,650 2	24
	200,000 2	
Balance Nov. 30, 1919,	\$73,679	30
2000000101100, 1010, 1010, 1010	4.0,010 0	-
STATEMENT OF RECEIPTS FOR 1919.		
GENERAL FORESTRY AND NURSERIES.		
For trees sold,	\$4,136	15
D D T		
Purchase and Planting of Forest Lands.		
Redemption and purchase of lots:—		
W. A. Wilson,	\$1,275 8	34
Boston & Maine Railroad	11 8	35
S. Bent & Brothers, Incorporated,	587 8	31

1920.]	PU	BLIC	D	OC1	UMI	ENT	Г—	No.	73.			41
Carolino S Joh	neon										\$166	50
Caroline S. Joh			*	•	•	•	•	٠	•	•	\$166	
Paul B. Morgan	ц, .	•	۰	•	٠	٠.	•	•	•	•	369	
Lessie M. Morg	gan,	.*	•			.*	•	٠	•	٠	481	
Levi H. Greenv			•	•	•	•	•	•	~	•	1,157	77
Cordwood so											0.0	00
French lot, .		•	•	٠	•	۰	٠	•	•	•	. 36	00
Miscellaneou			/ 1		,							0.1
Boston & Main						•	•	•	•	•	26	
Everett O. Fish	re & C	io.,	•	•	٠	٠	•	a	•	٠	1	50
										-		
•											\$4,113	43
											•	
	PR	EVEN	TION	OF	For	EST	FIRE	es.				
For equipment	from	towns	and	citi	es,						\$1,597	36
For fire towers:												
Athol, .						٠,	٠,				200	00
Carlisle, .							٠,				150	00
Erving, .											100	
Northfield,									•		100	
Orange, .											200	
Royalston,										•	100	
Warwick, .								•	•		200	
waiwick, .	•	•	.*	•	•	•	•	•	•	•	200	00
				,						-	***	
Total, .	•		•	- 1	•	•	•	•	•		\$2,647	36
Supp	RESSIC	N OF	Gv	PSV	AND	BRO	100'N	PATT.	Mo	THS		
	ILE SSIC	M OF	OI.		AND	Dic	7 17 14	LAIL	1110.	1115.	004	00
Ashby,	•	•	•	•	•		4	•	٠	•	\$84	
Auburn,	•	٠	•		•	•	•	•	•	٠		45
Ayer,	•	•	•	٠		۰	٠	•		•	984	
Bedford, .	•	•		•	•	•	•	•				96
Berkley,			•	•		•	•	•		•		89
Beverly,	•	•	•	٠	•	٠		•	a		3,000	00
Billerica, .					٠				4		125	15
				•	•					•	311	61
Boylston, .	•,										671	
Bridgewater, .					٠						1	02
Danvers, .											4	96
Dedham, .											39	00
Essex,	, •.										1,086	08
Freetown, .	• 1											17
Groveland,											73	00
										_		
Amount ca	rried f	orwar	d,								\$6,476	35

Amount brought f	orward	ł,							•	\$6,476	35
Hanson,										145	78
Holbrook,											73
Holden,										1,125	
Hopkinton,										732	
Littleton,							•			528	
Lynnfield,						•	•	•	•	1,286	
Manchester,		•				•			•	3,000	
Medfield,	•				•			•		326	
Medford,					•				•		00
Millis,						•		•			40
Princeton,										555	
Quincy,				•					•		25
Reading,	•									_	02
Rehoboth,	į		•		i					- 236	
Rockport,		•		•	•			• —			50
Rowley,					i			•		1,113	-
Saugus,							•	•		225	
Sharon,									i		31
Shrewsbury,										2,099	
Stoneham,										185	
Stoughton,										135	
Templeton,										1,140	
Topsfield,										497	
Waltham,											36
Wayland,										561	-
Wenham,										251	
West Boylston, .										869	
West Newbury, .		-						. 1	•		95
Westminster, .										765	
Weston,											10
Winchendon,										2,574	
TTT 13										397	
Yarmouth,				•							
mm as as a										100	
Russell Estate, .										95	
Chautauqua Associati	on, .										86
Edw. R. Macomber,										20	00
TO T TO II.			•							20	
Wm. D. Sohier, .										6,000	
Highway Commission,										194	
Barrels sold,										10	
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				-	•						

FINANCIAL SUMMARY OF MOTH WORK BY TOWNS AND CITIES.

In the following table we show the expenditures in detail for the year 1919, and also the required expenditure for 1920:—

			19:	19.			1920.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Re- quired Expend iture.
Abington, .	. \$1,499 08	-	-	-	_	-	\$1,531 57
Acton,	. 829 31	\$985 24	\$753 53 1 133 13	\$155 93	\$825 13	\$981 06	860 43
Acushnet, .	650 66	-	-	_	-	-	707 91
Amesbury, .	. 2,936 03	-	-	-	-	-	3,011 0
Andover, .	. 3,207 08	-	-	-	90	-	3,394 96
Arlington, .	. 5,000 00	-	-	-	-	-	5,000 00
Ashburnham,	. 542 05	1,128 62	134 24	586 57	241 03	827 60	537 91
Ashby,	. 280 42	638 61	336 661	358 19	430 00	788 19	296 00
Ashland, .	. 651 08	848 41	218 50	197 33	539 70	737 03	689 50
Athol,	. 2,992 78	-	-	-	-	-	3,288 0
Attleboro, .	. 5,000 00	-	-	-	-	_	5,000 0
Auburn, .	. 853 20	470 81	112 56	-	-	-	865 3
Avon,	. 489 03	478 00	102 45	- 1	163 20	152 17	524 3
Ayer,	. 1,228 07	1,348 82	148 75	120 75	407 70	528 45	1,246 8
Barnstable, .	. 3,407 73	-	-	-	-	-	3,693 7
Barre,	. 1,184 64	-	-	-	-	-	1,255 6
Bedford, .	. 783 09	1,817 29	{ 146 30 1 1,111 18	} 1,034 20	858 15	1,892 35	828 6
Bellingham, .	. 502 83	-	-	_	- 1		512 9
Belmont, .	. 5,000 00	-	- /	_	- 3	-	5,000 0
Berkley, .	. 245 14	155 13	41 35	_	-	-	271 2
Berlin,	. 262 74	1,133 86	175 36	871 12	419 64	1,290 76	268 1
Beverly, .	. 5,000 00	-	- 1	-	-	-	5,000 0
Billerica, .	. 2,515 84	-	-	-	16 81	-	2,565 4
Blackstone, .	. 808 06	-	-	_	-	-	828 8
Bolton,	. 322 51	1,198 55	705 00	876 04	1,050 19	1,926 23	331 8
Boston,	. 5,000 00	-	-	-	-	-	5,000 0
Bourne,	. 2,382 23	1,710 23	2,010 58	_	1,143 39	472 39	2,455 9
Boxborough, .	. 127 43	80 98	610 33 3 4 00	} -	708 77	662 32	129 2
Boxford, .	. 353 60	977 85	308 92	624 55	686 94	1,311 49	381 9
Boylston, .	. 244 16	946 39	337 72	702 23	354 16	1,056 39	236 2

¹ Lead sold.

			19	19.			1920.
CITIES AND TOWNS.	Re- quired Expend- iture.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Braintree,	\$3,844 14	-	_			-	\$4,084 64
Brewster,	325 03	\$819 26	\$47 951 255 28	} \$269 23	\$955 612	\$999 84	324 09
Bridgewater,	1,805 40	2,050 67	5 80 1 1,395 20	148 20	1,384 13	1,532 33	1,879 28
Brimfield,	291 68	-	-	_	-	-	341 34
Brockton,	5,000 00	-	-	-	-	-	5,000 00
Brookfield,	636 39	_	-	_	_	-	681 99
Brookline,	5,000 00	_	-	_	_	_	5,000 00
Burlington,	445 66	887 27	701 89	441 61	813 94	1,255 55	459 98
Cambridge,	5,000 00	_	_	_	_	_	5,000 00
Canton,	2,178 96	2,117 82	5,157 62	_	3,761 74	3,700 60	2,437 22
Carlisle,	201 35	2,467 11	674 81	1,990 76	1,331 762	3,047 52	205 85
Carver,	796 43	2,330 71	335 861	} 1,534 28	2,691 50	4,225 78	820 35
Charlton,	608 27	_	3,567 66	_	_	_	630 43
Chatham,	947 40	_	_	_	_	_	1,000 92
Chelmsford,	2,004 25	1,359 82	1,337 36	_	887 03	242 60	2,072 91
Chelsea,	5,000 00	_	_	_	_	_	5,000 00
Chilmark,	172 32	_	_	_	_	_	174 73
Clinton,	3,959 97	_		_	_	_	4,032 14
Caharrat	2,461 57	_	_			-/	2,619 11
C	2,804 60						2,832 50
Dana,	194 23						205 95
D	1	_	_		5 90		3,301 50
	3,276 13		_		<i>3 90</i> ≟		
Dartmouth,	2,361 12	_	_	_		_	2,463 10
Dedham,	5,000 00	-	-	_	39 00	-	5,000 00
Deerfield,	1,479 12	-	111.00	-	-	-	1,698 97
Dennis,	543 98	553 04	144 09	9 06	260 99	270 05	569 44
Dighton,	958 06	-	-	_	_	-	1,031 64
Douglas,	577 20	1 071 00	4 500 50	-	- 0.011.05		587 55
Dover,	1,067 24	1,851 28	1,520 53	777 66	2,214 83	2,992 49	1,081 83
Dracut,	1,138 53	2,039 19	846 38	900 66	1,294 27	2,194 93	1,193 56
Dudley,	997 13		-	-	-	-	1,133 61
Dunstable,	161 23	636 62	316 18	475 39	356 00	831 39	163 56
Duxbury,	1,355 11	2,683 11	1,633 80	1,328 00	1,364 41	1,692 41	1,366 25
East Bridgewater, .	1,344 96	1,557 70	483 74	212 74	806 83	1,019 57	1,368 20
Eastham,	177 50	-	-	-	- 1	- 1	214 90

¹ Lead sold.

² Includes sprayer.

			19	19.			1920.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expend iture.
Easthampton, .	\$4,242 09	-	-	-	-	_	-
Easton,	1,608 91	\$1,926 92	\$1,790 63	\$318 01	\$1,771 41	\$2,098 42	\$1,699 5
Edgartown,	684 33	-	-	-	-	-	702 98
Essex,	524 84	855 86	617 15	331 02	301 77	632 79	533 0
Everett,	5,000 00	- /	-	-	-	-	5,000 0
Fairhaven,	2,457 19	- 0	-	-	-	-	2,713 6
Fall River,	5,000 00	-	-	-	-	-	5,000 0
Falmouth,	2,846 73	2,776 89	647 86	-	1,419 92	1,080 06	2,948 2
Fitchburg,	5,000 00	-	-	-	-	-	5,000 0
Foxborough,	1,191 49	2,308 90	135 87	1,117 41	1,840 43	2,957 84	1,233 8
Framingham, .	5,000 00	-	-	-	-	-	5,000 0
Franklin,	2,234 46	-	-	-	-	-	2,315 9
Freetown,	517 56	-	-	_	113 50	_	549 1
Gardner,	4,556 03	_	-	-	-	_	4,766 8
Georgetown,	534 40	855 97	596 53	321 57	1,103 26	1,424 83	564 0
Gloucester,	5,000 00	_	-	-	-	-	5,000 0
Grafton,	1,396 48	815 46	100 00	-	-	-	1,423 7
Great Barrington, .	3,003 13	-	-	-	-	_	3,126 9
Greenfield,	5,000 00	_	-	-	_	_	5,000 0
Groton,	1,138 98	2,024 61	{ 440 781 526 33	} 885 63	865 27	1,750 90	_
Groveland,	597 77	542 34	93 80 ¹ 585 39	1 -	364 68	309 25	634 8
Halifax,	311 94	1,052 38	522 38	740 44	557 27	1,297 71	325 4
Hamilton,	1,561 12	3,098 58	1,370 51	600 00	757 20	1,357 20	1,608 5
Hanover,	777 13	2,099 94	1,699 11	1,097 81	2,297 182	3,169 99	830 1
Hanson,	824 01	1.014 96	592 71	190 95	490 99	681 94	805 5
Harvard,	771 45	992 68	[867 36 ¹	} 221 23	1,334 59	1,555 82	648 2
Harwich,	779 48	3,060 75	047 41 616 06	1,831 27	2,399 262	3,780 53	797 6
Haverhill,	5,000 00	_	-	_	-	_	5,000 0
Hingham,	2,811 67	_	_	_	_	_	2,895 9
Holbrook,	739 00	542 22	407 60	_	536 30	339 62	793 6
Holden,	828 56	2,207 74	449 25	1,379 18	1.003 472	2,157 65	1,010 2
Holliston,	840 67	1,203 05	80 33 1		1,354 492	916 87	855 5
Hopedale,	1,709 00		532 42	, _		_	1,713 9
Hopkinton,	751 74	1.376 34	53 70	624 60	170 98	795 58	778 6
Hubbardston,	326 19	1,010 01	00 10	021 00	110 30	, , , ,	352 5

¹ Lead sold.

² Includes sprayer.

			19:	19.			1920.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Re- quired Expend iture.
Hudson,	\$1,882 75	\$1,711 49	\$12 751 664 51	} -	\$6 81	-	\$2,084 9
Hull, ,	4,284 04	-	-	-	-	-	4,403 7
Ipswich,	2,254 91	2,349 89	1,658 05	-	1,478 09	\$1,478 09	2,382 0
Kingston,	658 63	1,116 11	821 72	\$457 48	604 52	1,062 00	674 8
Lakeville,	490 01	472 92	516 47	-	932 83	915 74	497 2
Lancaster, .	963 67	-	-	-	-	-	995 4
Lawrence, .	5,000 00	-	-	-	-	-	5,000 0
Leicester, .	1,072 55	-	-	-	-	-	1,091 3
Lenox,	2,961 12	-	-	-	-	-	2,953 5
Leominster, .	5,000 00	-	-	-	-	-	5,000 0
Lexington, .	3,410 94	6,908 12	17 05 ³ 1,657 18	} -	100 36	100 36	3,586 7
Leyden,	108 19	-	-	_	-	-	110 2
Lincoln, .	751 37	1,896 36	1,352 76	-	2,322 17	2,322 17	767 4
Littleton, .	536 99	453 41	600 91 1 45 75	} -	887 33	804 25	560 6
Lowell,	5,000 00	-	-	, -	_	-	5,000 (
Lunenburg, .	683 59	1,301 30	370 25 ¹ 7,780 07	} 202 56	1,732 33 2	1,519 74	710 8
Lynn,	5,000 00	-	-	, -	_	-	5,000 (
Lynnfield, .	646 99	1,544 17	630 89.	897 18	945 67	1,842 85	688
Malden,	5,000 00	-	-	-	-	-	5,000 (
Manchester, .	4,468 66	_	-	_	-	-	4,502
Mansfield, .	2,128 25	_	_	-	16 50	-	2,348
Marblehead, .	4,642 13	_	_	_	_	-	4,658
Marion,	1,305 77	1,460 48	1,156 62	_	1,482 85	1,482 85	1,316
Marlborough,	4,683 77	_	-	′		-	4,775
1011	1,097 80	1,364 56	128 081	3 41 76	2,228 182	2,044 94	1,103
10.1	186 18	2,307 37	1,763 14 661 25	1,896 59	1,164 69	2,836 28	192
Mattapoisett .	744 37	_	_	_	-	_	768
	1,819 15	_	_	_	_	_	1,928
W. 36.13	858 25	1,038 08	J 42 84	179 83	2,115 32	2,296 15	861
M. 161	5,000 00		371 37	-	-	_	5,000
M-1	770 70	_	_	_	_	_	812
Melrose,	5,000 00				_	_	5,000
Mendon, .	304 37			_	_	-	309
Merrimac	651 71	1,172 75	207 55	521 04	162 88	683 92	662
bieliniae, .	091 71	1,112 13	207 33	021 02	102 00	000 02	5,000

¹ Lead sold.

² Includes sprayer.

³ Supplies sold.

			19:	19.			1920.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expend- iture.
Middleborough, .	\$2,013 95	\$3,054 11	\$1,028 90	\$1,040 16	\$1,795 81	-	\$2,104 62
Middleton,	401 84	1,272 14	328 52	870 30	449 21	\$1,319 51	407 44
Milford,	4,194 49	-	-	-	-	-	4,250 30
Millbury,	1,404 94	-	-	-	-	-	1,483 50
Millis,	640 73	-	-	-	-	-	690 58
Millville,	501 66	-	-	-	-	- 1	515 79
Milton,	5,000 00	-	-	-	-	-	5,000 00
Monson,	868 76	-	-	-	-	- 1	826 42
Montague,	3,423 75	-	-	-	-	-	3,592 79
Nahant,	1,653 67	- 1	_	_	_	- 1	1,652 74
Nantucket,	2,202 52	-	_	-	-	_	2,223 16
Natick,	3,402 99	-	-	_	_	_	3,588 46
Needham,	3,851 44	_	_	_	78 00	_	3,960 63
New Bedford.	5,000 00	_	_	_	-	_	5,000 00
New Braintree, .	188 95		_	_	_	_	193 12
New Salem	222 07	_	_		_	_	216 12
Newbury	603 38	1.699 18	433 271	1,095 80	1.128 18	2,223 98	629 10
Newburyport, .	4,582 32	_	588 30	_	_	_	4,690 38
Newton.	5,000 00	_	_	_	_	_	5,000 00
Norfolk,	482 04	817 20	240 90	335 16	280 39	615 55	499 67
North Andover	2,364 66	3.016 92	269 501	1	1.351 09	1,351 09	2,429 85
No. Attleborough,	3.332 90	_	1,430 70	J	-	_	3,438 81
North Brookfield, .	832 08						860 17
North Reading, .	453 16	1,765 72	589 26	1,037 56	1,282 242	2,044 80	463 97
Northborough, .	773 89	1.831 98	676 99	1,058 09	824 22	1.882 31	778 43
N .11 .1	2,134 13	1,001 00	010 33	1,000 00	021 22	- 1,005 01	2,236 20
NT	721 70	1,036 93	159 38	315 23	497 43	812 66	777 91
N11			139 901			1,623 64	515 29
	5,000 00	1,070 40	2,070 62	302 13	1,058 89	1,020 04	5,000 00
Oak Bluffs	905 45						3,000 00
							170.44
Oakham,	181 85			_			173 40
Orange,	1,652 96	105051	201 77	200.01	001 :01	005.11	1,748 65
Orleans,	529 73	1,053 74	291 75	299 01	921 132	995 14	531 68
Oxford,	856 69	-				-	941 56
Palmer,	2,756 51	-	-	-	-	-	2,841 65

¹ Lead sold.

² Includes sprayer.

			19	19.			1920.
CITIES AND TOWNS.	Re- quired Expend- iture.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Paxton,	\$170 91	_	_		-	-	\$169 77
Peabody, .	5,000 00	-	-	-	-	-	5,000 00
Pembroke, .	541 89	\$2,831 34	\$1,481 21	\$2,289 45	\$2,260 86	\$4,550 31	551 66
Pepperell, .	1,017 64	2,877 20	{ 100 90 1 593 10	} 1,316 08	1,040 68	2,356 76	1,021 54
Petersham, .	428 76	-	-	_	-	-	446 59
Phillipston, .	135 88	-	-	-	-	-	136 61
Plainville, .	446 83	791 86	63 70	345 03	462 05	807 08	-
Plymouth, .	5,000 00	-	-	_	_	-	5,000 00
Plympton, .	196 55	1,556 53	{ 12 00 1 131 82	} 1,359 98	420 14	1,780 12	207 03
Princeton, .	447 82	2,228 41	196 04	1,780 59	816 20	2,596 79	452 54
Provincetown,	1,264 48	_	-	_		-	1,355 58
Quincy,	5,000 00	_	_	_	_	-	5,000 00
Randolph, .	1,121 36	_	_	_		-	1,161 62
Raynham, .	506 25	520 98	335 01	_	804 14	804 14	526 22
Reading, .	3,233 19	_	_		36 94	-	3,277 45
Rehoboth, .	471 23	_	_	_	181 60	-	471 94
Revere,	5,000 00	_	_	_	-	-	5,000 00
Rochester, .	436 95	602 19	278 10	165 24	385 28	550 52	452 87
Rockland, .	2,168 15	_	_	_	_	-	2,277 72
Rockport, .	1,732 93	_		_	2 58	_	1,772 64
Rowley,	405 24	1,616 82	$\left\{\begin{array}{c} 185\ 70^{1} \\ 476\ 02 \end{array}\right.$	} 1,211 58	663 86	1,875 44	413 22
Royalston, .	357 73	_	-	, -	_	-	380 60
Rutland, .	400 93	_	_	_	_	-	431 15
Salem,	5,000 00	_	_	_	_	-	5,000 00
Salisbury, .	783 06	1,124 22	{ 76 571	341 16	665 25	1,006 41	811 89
Sandwich, .	575 71	1,056 59	$ \left. \begin{array}{c} 398 \ 40 \\ 256 \ 97^{1} \\ 172 \ 32 \end{array} \right. $	480 88	1,002 86	1,483 74	586 67
Saugus,	3,127 06	_	112 32	, -	450 00 ²	_	3,206 92
Scituate, .	2,473 49	2,919 14	36 841	} -	2,587 54	2,426 75	2,533 41
Seekonk, .	850 77	_	2,669 40	_	_	_	979 24
Sharon,	1,409 18	_	_	_	20 99	_	1,442 26
Sherborn, .	643 83	2,235 22	{ 594 901	} 1,591 39	589 52	2,180 91	669 14
Shirley,	574 76	613 23	990 57 62 00 1	1)	576 22	576 22	654 29
Shrewsbury, .	1,453 30	2,044 66	199 00 924 76	591 36	567 47	1,158 83	1,658 05
Somerset, .	811 68	_	_	_	_	_	997 17
Somerville, .	5,000 00						5,000 00

¹ Lead sold.

² Includes sprayer.

			19	19.			1920.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Southborough, .	\$878 48	\$2,027 24	\$1,096 20	\$923 76	\$1,367 452	\$2,066 21	\$893 45
Spencer,	1,424 03	-	-	-	-	-	1,458 37
Springfield,	5,000 00	-	-	-	-	-	5,000 00
Sterling,	556 27	915 12	{ 186 961 87 70	358 85	499 93	858 78	579 03
Stockbridge,	1,804 38	-	-	-	-		1,879 94
Stoneham,	2,613 96	2,613 96	986 58		844 31	675 75	2,975 59
Stoughton,	2,254 84	2,441 60	{ 10 801 949 60	} 186 76	1,101 47	1,288 23	2,400 19
Stow,	456 71	1,881 26	837 73	1,424 55	861 02	2,285 57	462 51
Sturbridge,	399 88	-	_	-	-	-	428 93
Sudbury,	574 06	1,125 69	\$\begin{cases} 925 361 \\ 374 65 \end{cases}\$	} 551 63	893 48	1,445 11	580 10
Sutton,	650 46	_	(3/1/00	, –	-	-	665 65
Swampscott,	5,000 00	_	_	_	_	_	5,000 00
Swansea,	731 06	_	_	_	_	_	772 03
Taunton,	5,000 00	_	_	_		_	5,000 00
Templeton,	1,021 79	1,244 50	220 70	222 71	251 91	474 62	_
Tewksbury,	1,112 63	2,298 30	548 84	1,185 67	905 72	2,091 39	1,099 64
Tisbury,	839 40	_	_ 1	_	_	_	866 55
Topsfield,	877 39	854 46	277 11	_	256 87	233 94	943 41
Townsend,	563 69	1,476 99	799 95	913 30	585 58	1,498 88	569 79
Truro,	222 85	381 96	67 65	159 11	174 52	333 63	253 08
Tyngsborough, .	369 37	3,345 95	1,245 47	2,975 58	1,293 87	4,269 45	374 33
Upton,	565 98	-		-	_	_	546 86
Uxbridge,	1,743 96	_	_	_	_	_	1,971 59
Wakefield,	5,000 00	_	_	_	_	_	5,000 00
Walpole,	2,965 19	_		_	78 00	_	2,964 11
Waltham,	5,000 00	_	_	_	20 04	_	5,000 00
Ware,	2,467 70	_	_	_	_	_	2,519 09
Wareham,	2,520 54			_	_	_	2,733 90
W	1,073 46			_	_	_	1,180 40
W	181 87						181 97
Watertown,	5,000 00						5,000 00
Wayland,	968 88	363 35	∫ 693 65 ¹	1	1.068 61	463 08	0,000 00
Wahatan		303 33	755 45	,	1,000 01	300 00	2,685 05
	2,573 86						5,000 00
Wellesley, .	5,000 00						3,000 00

¹ Lead sold.

² Includes sprayer.

			19:	19.			1920.
CITIES AND TOWNS.	Required Expenditure.	Total Net Expend- iture.	Private Work.	Re- imburse- ment.	Tools supplied.	Total Amount received from State.	Required Expenditure.
Wendell,	\$236 90	-	-	-	-	-	\$275 34
Wenham,	890 26	\$450 87	\$370 43	- 1	\$566 06	\$126 67	906 25
West Boylston, .	442 91	753 74	343 35	\$310 83	521 61	832 44	452 68
West Bridgewater, .	757 85	2,131 50	600 91	1,148 65	1,400 312	2,323 96	793 08
West Newbury, .	407 98	489 91	{ 131 701 342 16	} 81 93	514 93	596 86	416 02
West Tisbury, .	226 09	-	-	-		-	228 49
Westborough, .	1,341 81	1,998 52	734 51	656 71	568 09	1,224 80	1,361 57
Westford,	958 83	1,171 09	369 00 ¹ 515 21	} 212 26	1,259 65	1,471 91	994 99
Westminster,	403 89	941 24	299 04	537 35	282 92	820 27	465 59
Weston,	2,012 96	2,518 91	920 00	505 95	2,189 33	-	2,054 91
Westport,	1,234 39	-	-	_	78 00	-	1,239 29
Westwood,	1,061 71	-	-	-	-	-	1,026 17
Weymouth,	5,000 00	-	-	-	-	-	5,000 00
Whitman,	2,282 27	-	_	-	-	-	2,339 37
Wilmington,	879 46	2,375 80	761 20	1,496 34	1,370 16	2,866 50	888 55
Winchendon,	1,813 99	2,741 49	812 50	927 50	460 63	1,388 13	1,857 80
Winchester,	5,000 00	-	-	_	-	-	5,000 00
Winthrop,	5,000 00	_	-	-	-	_	5,000 00
Woburn,	5,000 00	-	-	-	-	-	5,000 00
Worcester,	5,000 00	-	-	-	-	-	5,000 00
Wrentham,	699 86	-	-	-	11 80	-	728 94
Yarmouth,	760 41	935 12	$\left\{\begin{array}{c} 17\ 52^{1} \\ 467\ 29 \end{array}\right.$	} 174 71	1,175 822	1,125 53	788 52

¹ Lead sold.

² Includes sprayer.

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS.

[Alphabetically by towns and cities.]

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
157-W, Rockland,	Sumner L. Deane, .	Abington,	C. F. Shaw,	5
71-4, West Acton,	Wm. H. Kingsley, .	Acton,	J. O'Neil,	2
2003-М,	Henry F. Taber, .	Acushnet,	A. P. R. Gilmore, .	4
121-X,	Edgar A. Deyette, .	Adams,	John Clancy,	6
6465-M, River, .	E. M. Hitchcock, .	Agawam,	E. M. Hitchcock, .	6
161-6,	W. F. Milligan,	Alford,		-
274-М,	Jas. E. Feltham,	Amesbury,	Joseph Merrill,	3
483-J,	A. F. Bardwell,	Amherst,	W. H. Smith,	6
212,	Lester Hilton,	Andover,	Edw. H. Berry, .	3
35 and 206,	Daniel M. Daley, .	Arlington,	Daniel M. Daley, .	2
5-12,	C. H. Billings,	Ashburnham, .	Chas. H. Pratt, .	2
2-3,	W. S. Green,	Ashby,	Fred C. Allen,	2
3-5,	Ralph Tredick,	Ashfield,	Chas. A. Smith, .	6
	Chester W. McNear, .	Ashland,	Theodore P. Hall, .	2
18-3,	Frank P. Hall,	Athol,	W. S. Penniman, .	6
34-R-4,	H. R. Packard,	Attleboro,	W. E. S. Smith, .	4
5-12,	J. F. Searle,	Auburn,	J. F. Searle,	6
	Chas. S. Wheeler, .	Avon,	W. W. Beals,	4
306-2,	D. C. Smith,	Ayer,	D. C. Smith,	2
144-2,	H. C. Bacon,	Barnstable, .	Robert Cross,	5
83-4,	A. E. Traver,	Barre,	Jas. A. Dwinnell, .	В
18 and 8000, .	P. B. McCormack, .	Becket,		-
498-W, Lexington,	Irving C. Waite,	Bedford,	W. A. Cutler,	3
62-4,	John J. Fairchild,	Belchertown, .	E. C. Howard,	Б
8639-2, Milford, .	L. F. Thayer,	Bellingham, .	Lewis E. Whitney, .	4
409-W,	John F. Leonard, .	Belmont,	Martin Troy,	2
1367-М,	Gideon H. Babbitt, .	Berkley,	A. A. Briggs,	4
17-2,	Forrest E. Day,	Berlin,	E. C. Ross,	2
43-12,	Edson W. Hale,	Bernardston, .	Edwin B. Hale,	6
20 and 95-0,	R. H. Grant,	Beverly,	Jas. W. Blackmer, .	1
22-4 and 22-5, .	E. N. Bartlett,	Billerica,	Fred L. Winship, .	3
	John H. Dwyer,	Blackstone, .	A. J. Duggan,	6
16-3,	I. E. Whitney,	Blandford,		-
3-3,	Albert I. Pardee,	Bolton,	C. E. Mace,	2
		Boston,	Wm. P. Long,	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
38,	Walter E. R. Nye, .	Bourne,	Edw. D. Nickerson, .	5
102-2,	H. J. Livermore, .	Boxborough, .	S. D. Salmon, 3d, .	2
19-31,	C. E. Brown,	Boxford,	C. Perley,	3
29-2,	John N. Flagg,	Boylston,	Walter G. Brigham, .	6
	James M. Cutting, .	Braintree,	Clarence R. Bestick, .	4
76-23,	T. B. Tubman,	Brewster,	Abbott N. Baker, .	5
281-13,	F. C. Worthen,	Bridgewater, .	F. C. Worthen,	5
18-2,	Geo. E. Hitchcock, .	Brimfield,	Frank G. Hitchcock, .	6
1041,	Wm. F. Daley,	Brockton,	Rufus H. Carr,	5
104-11,	P. E. Gadaire,	Brookfield,	J. H. Conant,	6
	Geo. H. Johnson, .	Brookline,	Ernest B. Dane,	1
52-8,	Gilbert E. Griswold, .	Buckland,		-
15-4,	W. W. Skelton,	Burlington, .	W. W. Skelton,	3
		Cambridge, .	J. F. Donnelly,	2
	C. J. Callahan,	Canton,	Wm. H. Gallivan, .	4
76-M, Concord, .	Geo. G. Wilkins, .	Carlisle,	Geo. G. Wilkins, .	3
	Jas. S. McKay,	Carver,	James S. McKay, .	5
14-12,	A. L. Veber,	Charlemont, .		-
42-2,	E. A. Lamb,	Charlton,	J. D. Fellows,	6
28-3,	Geo. W. Ryder,	Chatham,	Richard G. Luard, .	5
1597-R,	A. C. Perham,	Chelmsford, .	Walter Shepard, .	3
		Chelsea,	J. A. O'Brien,	1
	Warren E. Brown, .	Cheshire,		-
	Wm. H. Babb,	Chester,		-
4-2,	Chas. Bisbee,	Chesterfield, .		-
149-M,	John E. Pomphret, .	Chicopee,	Edw. Bourbeau, .	6
	Almon S. Tilton, .	Chilmark,	Almon S. Tilton, .	5
485-X,	A. G. Caswell,	Clarksburg, .	A. G. Caswell,	6
268-W and 180, .	Adin W. Custance, .	Clinton,	Peter R. Gibbons, .	2
260,	Wm. J. Brennock, .	Cohasset,	George Young,	5
23-2,	F. A. Walden,	Colrain,	E. F. Copeland, .	6
72 and 458-M, .	Harry E. Tuttle, .	Concord,	H. P. Richardson, .	2
15-2,	Edgar Jones,	Conway,		-
41-2,	Wm. H. Mansell, .	Cummington, .		-
86-W,	S. L. Caesar,	Dalton,		-
	L. H. Thayer,	Dana,	Thos. L. Thayer, .	6
495-W,	Wm. E. Berry,	Danvers,	T. E. Tinsley,	1
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LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
1658-5 New Bed- ford.	C. H. Mead,	Dartmouth, .	E. M. Munson, .	4
35-R,	H. J. Harrigan,	Dedham,	J. T. Kennedy,	4
	Wm. L. Harris,	Deerfield,	Wm. L. Harris,	6
8118-4,	Wm. E. Pierce,	Dennis,	Joshua Crowell,	5
29-3,	Ralph Earle,	Dighton,	Albert N. Goff, .	4
11-4,	W. L. Church,	Douglas,	F. J. Libby,	6
	Geo. W. Armstrong, .	Dover,	H. L. MacKenzie,	4
	F. H. Gunther,	Dracut,	T. F. Carrick,	3
423-R, Webster, .	Frank A. Putnam,	Dudley,	Herbert J. Hill.	6
9-11, Tyngsbor-	A. W. Swallow,	Dunstable,	W. H. Savill,	2
ough. 82-2,	H. E. Merry,	Duxbury.	John D. Morrison	5
68-2,	M. F. Roach,	E. Bridgewater, .	Allan B. Shaw	5
25.	F. C. Burton,	E. Longmeadow,	Herman W. King.	6
24-3,	Adin L. Gill,	Eastham,	N. P. Clark,	5
306-12,	John M. Dineen.	Easthampton, .	Chas. Kuhfuss	6
76 and 67.	Fred Hanlon,	Easton,	Roscoe W. Melendy, .	4
	Manuel Roberts.	Edgartown, .	John P. Fuller,	5
165-25,	Frank Bradford,	Egremont,	H. C. Moore,	6
31-2	Clinton Powell.	Enfield,	C. H. Holmes, .	6
	C. H. Holmes.	Erving,	C. H. Holmes,	6
51-3	Otis O. Story,	Essex,	Otis O. Story,	1
	_	Everett,	Dana Hanson,	2
1686-Y,	C. F. Benson,	Fairhaven.	G. W. King,	4
822-W,	Wm. Stevenson.	Fall River.	Wm. Stevenson,	4
136-2,	H. H. Lawrence,	Falmouth,	W. W. Eldridge, Jr., .	5
745,	Guy A. Hubbard,	Fitchburg,	Guy A, Hubbard, .	2
9417-3, Hoosac Tunnel pay sta-	H. B. Brown,	Florida,	-	-
tion. 76 and 121,	Ernest A. White,	Foxborough, .	C. W. Parkhurst, .	4
352-4,	B. P. Winch,	Framingham, .	N. I. Bowditch, .	2
66-12,	E. S. Cook,	Franklin,	J. W. Stobart,	4
7-3,	Oscar M. Hanson, .	Freetown,	G. M. Nichols,	4
191 and 161,	G. S. Hodgman, .	Gardner,	Chas. J. Crabtree, .	6
85-14,	N. B. Madison,	Gay Head,	N. B. Madison,	5
71-12 and 8046-2, .	Thos. A. Watson,	Georgetown, .	Jacob Hazen,	3
222-12,	Lewis C. Munn,	Gill,	Warren R. Purple, .	. 16
1043-M.	Geo. W. O'Maley,	Gloucester, .	Harland W. Dann, .	1

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	Frank L. Rice,	Goshen,	-	-
	F. A. Veeder,	Gosnold,		_
18-2,	E. E. Sibley,	Grafton,	C. K. Despeau,	6
	Charles Rust,	Granby,	George A. Harris, .	6
5-13,	Albert C. Sheets,	Granville,		-
327-W,	D. W. Flynn,	Great Barring-	Daniel W. Flynn, .	6
1185,	John W. Bragg,	ton. Greenfield,	John W. Bragg,	6
33-24,	Wm. H. Walker,	Greenwich, .	Thos. Severance, Jr.,	6
71-5,	C. M. Raddin,	Groton,	Shadrach Evans, .	2
3655-X,	S. E. Johnson,	Groveland,	R. D. Larive,	3
651-33,	Edw. P. West,	Hadley,	Leroy C. Sabin, .	6
106-7, Bridgewater,	D. M. Briggs,	Halifax,	John A. Wood,	5
6-2,	Fred Berry,	Hamilton,	Harry R. McGregor, .	1
	John Swenson,	Hampden,		-
17-F-2,	C. F. Tucker,	Hancock,		-
441-Y, Rockland,	Louis E. Stone,	Hanover,	Chas. B. Drew,	5
12-23, Bryantville,	George T. Moore,	Hanson,	George T. Moore,	5
43-12,	George J. Fay,	Hardwick,	George J. Fay,	6
63-3,	Geo. C. Maynard, .	Harvard,	Geo. C. Maynard, .	2
103-3,	John Condon,	Harwich,	Arthur F. Cahoon, .	5
72-4,	Fred T. Bardwell,	Hatfield,	Seth W. Kingsley,	6
4-1,	John B. Gordon, .	Haverhill,	M. J. Fitzgerald, .	3
17-7,	Herbert A. Holden, .	Hawley,		-
5-18,	S. G. Benson,	Heath,		-
570 and 344-M, .	Wm. L. Howard, .	Hingham,	T. L. Murphy, .	5
33-12,	Alfred N. Warren, .	Hinsdale,		-
297-М,	M. L. Coulter,	Holbrook,	Walter C. Belcher, .	4
42-4,	W. H. Stearns,	Holden,	Winfred H. Stearns, .	6
5-21, Brimfield, .	Oliver L. Howlett, .	Holland,	W. A. Morse,	6
113,	Waldo A. Collins, .	Holliston,	Herbert E. Jones, .	2
1167-W,	C. J. Haley,	Holyoke,	T. A. Bray,	6
248-W,	S. E. Kellogg,	Hopedale,	C. E. Nutting,	6
19,	Geo. W. Smith,	Hopkinton, .	W. A. MacMillan, .	6
8040 and 24-4, .	Albert E. Bennett, .	Hubbardston, .	Chas. P. Wyman, .	6
24,	M. P. Mitchell,	Hudson,	T. J. Higgins,	2
		Hull,	John F. Smith,	5
4-11,	John J. Kirby,	Huntington, .		-
				<u></u>

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
137-W,	Edw. H. Smith,	Ipswich,	J. A. Morey,	1
103,	Roland Bailey,	Kingston,	Chas. H. Childs, .	5
261-W,	N. F. Washburn, .	Lakeville,	N. F. Washburn, .	5
218-J,	A. W. Blood,	Lancaster,	L. R. Griswold, .	2
1295-24,	King D. Keeler,	Lanesborough, .	King D. Keeler, .	6
362 and 3610, .	F. J. Morris,	Lawrence,	John H. Brown, .	3
66-M,	Jas. W. Bossidy,	Lee,		-
35-5,	John A. Fitzpatrick, .	Leicester,	J. H. Woodhead, .	6
60 and 135,	O. R. Hutchinson, .	Lenox,	T. Francis Mackey, .	6
28, 29 and 546, .	F. A. Russell,	Leominster, .	D. E. Bassett,	2
9-25,	Fred L. Morrison, .	Leverett,	I. H. Taylor,	6
480,	Osborne J. Gorman, .	Lexington,	Osborne J. Gorman, .	13
284-41,	A. G. Parks,	Leyden,	A. G. Parks,	6
44-W,	John J. Kelliher, .	Lincoln,	John J. Kelliher, .	2
17-4,	A. E. Hopkins,	Littleton,	A. E. Hopkins,	2
6375-J, River, .	Oscar C. Pomeroy, .	Longmeadow, .		-
3400,	Edw. F. Saunders, .	Lowell,	J. G. Gordon,	13
1-12,	H. A. Munsing,	Ludlow,	Ashley N. Bucher, .	6
20,	J. S. Gilchrest,	Lunenburg, .	J. S. Gilchrest,	2
1174 and 5613-J, .	D. J. Dineen,	Lynn,	John P. Morrissey, .	1
3682-М,	F. C. Newhall,	Lynnfield,	L. H. Twiss,	1
	W. B. Gould,	Malden,	Watson B. Gould, .	2
319-W,	Peter A. Sheahan, .	Manchester, .	Peter A. Sheahan, .	1
281-W, 1-R and	Herbert E. King, .	Mansfield,	Alexander Murphy, .	4
1-W. 355,	John T. Adams,	Marblehead, .	W. H. Stevens,	1
117-2,	George B. Nye,	Marion,	J. Allenach,	5
	Edw. C. Minehan, .	Marlborough, .	M. E. Lyons,	2
43-3,	Wm. G. Ford,	Marshfield,	P. R. Livermore,	5
31-2, Cotuit, .	Darius Coombs,	Mashpee,	S. H. Peters,	5
53-5,	Chas. T. Dexter, .	Mattapoisett, .	Jas. A. Barlow,	5
115-4 and 72,	Geo. H. Gutteredge, .	Maynard,	John F. Cleary, .	2
103-3,	Lawrence M. Dewar, .	Medfield,	G. L. L. Allen,	4
138,	Thomas A. Qualey, .	Medford,	Hugh G. Kennedy, .	2
6-2,	John B. Durfee,	Medway,	F. Hagar,	4
		Melrose,	J. J. McCullough, .	3
	Carl M. Taft,	Mendon,	F. M. Aldrich,	6
3-5,	Chas. R. Ford,	Merrimac,	Chas. R. Ford,	3

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
	Geo. E. Douglas, .	Methuen,	A. H. Wagland,	3
76-Y,	John J. Fowler, Jr., .	Middleborough, .	John J. Fowler, Jr., .	5
8000,	Geo. E. Cook,	Middlefield, .	-	-
63-23,	Oscar H. Sheldon, .	Middleton,	B. T. McGlauffin, .	1
37-M,	E. J. Burke,	Milford,	P. F. Fitzgerald, .	6
259,	Harry L. Snelling, .	Millbury,	E. F. Roach,	16
73,	Chas. LaCroix,	Millis,	Ralph L. Choate, .	4
1149-J, Woon - socket, R. I.	R. M. McLaughlin, .	Millville,	Patrick Britt,	6
1022-W,	Ralph S. Carpenter, :	Milton,	Ralph S. Carpenter, .	4
13-13, Readsboro,	Edward C. Davis, .	Monroe,		-
Vt. 12-22,	O. E. Bradway,	Monson,	Robert S. Fay,	6
14-14,	Thomas Berard,	Montague,	F. B. Gillette,	6
164-25,	Jasper H. Bills,	Monterey,		-
3-24,	Andrew J. Hall,	Montgomery, .		-
17-6,	Howard Porter,	Mount Washing-		-
16-3,	E. W. Francis,	ton. Nahant,	Herbert Coles,	. 1
16-3,	E. W. Francis,	Nantucket, .	W. M. Voorneveld, .	5
31 and 248-W,	Wm. H. Connolly,	Natick,	S. H. Hunnewell,	2
142	H. Howard Upham, .	Needham,	George Twigg,	4
	Chas. S. Baker,	New Ashford, .		_
2280,	Edw. F. Dahill,	New Bedford, .	C. F. Lawton,	4
6-4, Gilbertville, .	Frank A. Morse.	New Braintree, .	E. L. Havens,	6
13-6,	E. M. Stanton	New Marlbor-		_
113-5,	Frank Hamilton.	ough. New Salem,	Frank Hamilton	6
1112-5,	Wm. P. Bailey,	Newbury,	Percy Oliver,	3
380,	Chas. P. Kelley,	Newburyport, .	Chas. P. Kelley,	3
	W. B. Randlett,	Newton,	Chas. Benyon,	2
South.	S. C. Watson,	Norfolk,	J. Albert Buckley,	4
41-13, Franklin, .		North Adams,	Jackson L. Temple,	6
265 and 205-W, .	H. J. Montgomery, .	North Andover.	Wm. L. Smith,	3
1029-J,	Wm. L. Smith,	North Attlebor-	F. P. Toner,	4
282-W and 317-R-1,	H. W. Tufts,	ough	S. B. Colburn,	6
63-4,	Oscar C. Hirbour, .	North Brookfield	George E. Eaton, .	3
49,	George E. Eaton, .	North Reading,		6
165,	F. E. Chase,	Northampton, .	Chas. A. Maynard, .	6
12-11,	C. E. Bailey,	Northborough, .	Harry Ellsworth, .	
71-5 and 182, Whit- insville.	W. E. Burnap,	Northbridge, .	A. F. Whitin,	6
114-2,	Fred W. Doane,	Northfield,	F. W. Doane,	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telephone Number.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
18-11,	Geo. H. Storer,	Norton,	Wm. G. Briggs, Jr., .	4
15-3,	John T. Osborne,	Norwell,	Fred M. Curtis, .	5
417-M,	F. W. Talbot,	Norwood,	Wm. P. Hammersley,	4
241-12,	Geo. A. Smith,	Oak Bluffs,	Frank F. Blanken-	5
17-5,	C. H. Trowbridge, .	Oakham,	ship. C. H. Trowbridge, .	6
232-12,	Wm. Walsh,	Orange,	Elbridge S. Blodgett,	6
33-2,	James Boland,	Orleans,	A. Smith,	5
11-5,	George A. Barton, .	Otis,		-
9-5,	Olin D. Vickers,	Oxford,	C. G. Larned,	6
53-W and 53-R, .	James Summers, .	Palmer,	C. H. Keith,	6
1255-W Cedar, .	Geo. W. VanWyck, Jr.,	Paxton,	H. S. Robinson, .	6
213-M,	John J. Callahan, .	Peabody,	J. J. Callahan,	1
5-W,	John H. Hubbard, .	Pelham,	Leigh Weaver,	16
83-3 Bryantville,	Jos. J. Shepherd, .	Pembroke,	Wm. C. Jones,	5
8015-4 Hanover. 23-21,	Grant M. Palmer, .	Pepperell,	J. Tune,	2
	Walter H. Pike,	Peru,		-
61,	George Marsh,	Petersham,	Daniel Broderick, .	6
176-6,	Wm. H. Cowlbeck, .	Phillipston, .	Wm. H. Cowlbeck, .	6
834 and 535-M, .	Chas. S. Klein,	Pittsfield,		-
17-6,	E. H. Nye,	Plainfield,		-
	Henry A. Boerger, .	Plainville,	George H. Snell, .	4
264,	Ira C. Ward,	Plymouth,	A. A. Raymond, .	5
13-7, Kingston .	David L. Bricknell, .	Plympton,	David L. Bricknell, .	5
19-4, Cooleyville,	Fred W. Doubleday, .	Prescott,	C. M. Pierce,	6
13-4,	Fred W. Bryant, .	Princeton,	F. A. Skinner,	6
159-11,	Jas. H. Barnett,	Provincetown, .	F. G. Hill,	5
1,	Faxon T. Billings, .	Quincy,	A. J. Stewart,	4
134-W,	F. Burt Jazuith,	Randolph,	Chas. H. Cole,	4
1161-W,	E. E. Chickering, .	Raynham,	G. M. Leach,	14
430,	O. O. Ordway,	Reading,	H. M. Donegan, .	3
11-12,	B. F. Munroe,	Rehoboth,	Chas. B. Douglas, .	4
		Revere,	G. P. Babson,	1
8-2,	T. B. Salmon,	Richmond,		-
12-32,	D. E. Hartley,	Rochester,	Samuel H. Corse, .	5
55-X,	John H. Burke,	Rockland,	F. H. Shaw,	5
14-4,	John C. Martin,	Rockport,	F. A. Babcock,	1
22-6,	Merritt Peck,	Rowe,		-

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS — Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div. No.
3-13,	Daniel O'Brien,	Rowley,	Chas. Curtis,	3
177-5, Athol, .	M. E. Stockwell, .	Royalston,	E. S. Stewart,	6
11-3,	S. S. Shurtleff,	Russell,		-
13-4,	H. E. Wheeler,	Rutland,	H. E. Wheeler,	6
		Salem,	Wm. F. Cotter,	1
123-13,	Jas. H. Pike,	Salisbury,	Chas. J. Penniman, .	3
202-3,	S. D. Strickland, .	Sandisfield, .		-
76-2,	J. R. Holway,	Sandwich,	Lincoln Crowell, .	5
346-W,	T. E. Berrett,	Saugus,	T. E. Berrett,	1
4-16,	C. E. Tilton,	Savoy,		-
129-3,	E. R. Seaverns,	Scituate,	Wm. F. Ford,	5
462-J-2, Paw-	Herbert S. Baker,	Seekonk,	C. A. Smith.	4
tucket. 10 and 43-5.	W. C. Morse,	Sharon,	Fred A. White	4
75	C. H. Warner,	Sheffield,		_
130-2	Chas. F. Dole,	Shelburne,	Chas. F. Dole	6
	John C. Jackson,	Sherborn,	Geo. W. Rock,	2
	Asa A. Adams,	Shirley,	Asa A. Adams,	2
	Edw. A. Logan,	Shrewsbury, .	Robt. C. Clapp, .	6
	C. N. Mellen,	Shutesbury,	E. Colfax Johnson, .	6
928-M,	F. B. Butterworth,	Somerset,	C. Riley,	4
720-III,		Somerville,	A. B. Prichard.	2
22, Holyoke,	Louis H. Lamb,	South Hadley,	Louis H. Lamb,	6
			Louis II. Lamo, .	
151-14,	W. J. Lyman,	Southampton, .	Harma Burnatt	-
13, Marlborough, 3505, Fort Hill.	Harry Burnett,	Southborough, .	Harry Burnett,	6
11,	Aimee Langevin,	Southbridge,	Aimee Langevin, .	6
35-3,	B. M. Hastings,	Southwick,		-
134-3,	Earl J. Potter,	Spencer,	G. Ramer,	
20 and 167-2, Or- chard.	F. C. Smith,	Springfield,	L. Fletcher Prouty, .	6
5-12,	Joel T. Wilder,	Sterling,	J. H. Kilburn,	2
53-M,	George Schneyer, .	Stockbridge, .	George Schneyer, .	6
176-W,	Albert J. Smith,	Stoneham,	G. M. Jefts,	3
218-2 and 121-3, .	Fred H. Pye,	Stoughton, .	W. P. Kennedy, .	4
166-11, Hudson, .	Harold A. Priest,	Stow,	H. W. Herrick,	2
6-1,	C. M. Clark,	Sturbridge, .	C. M. Clark,	6
5-4,	Seneca W. Hall,	Sudbury,	Chas. A. Brackett, .	2
46, South Deer-field.	A. C. Warner,	Sunderland, .	Richard Graves, .	6
58-4, Millbury, .	R. H. Richardson, .	Sutton,	R. H. Richardson, .	6

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

Telepeone	F . W 1	- O	Local Moth	Div.
NTMBER.	Forest Warden.	Town or City.	Superintendent.	No.
1911-J	Everett P. Mudge, .	Swampscott, .	Everett P. Mudge, .	1
468-W,	Thos. L. Mason,	Swansea,	A. E. Arnold,	4
1 and 320,	Fred A. Leonard, .	Taunton,	H. M. Briggs,	4
39 and 30,	C. A. Fletcher,	Templeton, .	J. B. Wheeler,	6
4249-J,	Harris M. Briggs, .	Tewksbury,	H. M. Briggs,	3
161-4 and 102-3, .	Elmer C. Chadwick, .	Tisbury,	H. W. McLellan,	5
269-16,	Rupert E. Clark, .	Tolland,		-
36-6,	Wayland Burnham, .	Topsfield,	Wayland E. Burnham,	1
14-4,	Mark R. Colby,	Townsend, .	G. E. King,	2
	Walter F. Rich,	Truro,	J. H. Atwood,	5
25-12,	Chas. J. Allgrove, .	Tyngsborough, .	C. J. Allgrove,	3
278-3,	Geo. R. Warren,	Tyringham, .		-
9-3,	Henry E. Allard, .	Upton,	Clarence L. Goodrich,	6
	Lewis F. Maroney, .	Uxbridge,	Willard Holorook, .	(8)
59 and 548-M, .	W. E. Cade,	Wakefield,	W. W. Whittredge, .	3
9-11 and 9-23, .	L. H. Thompson, .	Wales,	M. C. Royce,	6
107-2,	Jas. J. Hennessey, .	Walpole,	Phillip R. Allen, .	2
6	George L. Johnson, .	Waltham,	W. M. Rysz,	2
	Alfred H. Pigeon, .	Ware,	P. Zeissig	6
167,	James J. Walsh,	Wareham,	J. J. Walsh,	5
	T. M. Collins,	Warren,	Alex. A. Geniron, .	6
73-12,	C. A. Williams,	Warwick,	Chas. Bass,	6
12-4, Becket, .	Arthur L. Hayes, .	Washington, .		-
116, Newton	Van D. Horton,	Watertown, .	Van D. Horton, .	2
South. 31-3,	Howard C. Haynes, .	Wayland,	D. J. Graham,	2
101-R,	E. L. Wallis,	Webster,	C. Klebart,	8
9,	John P. Doyle,	Wellesley,	Thos. T. Watt,	4
	John Holbrook,	Wellfleet,	Wm. H. Gill,	5
6-13, Cooleyville,	C. A. Fiske,	Wendell,	G. E. Mills,	6
74,	Jacob D. Barnes, .	Wenham,	J. E. Kavanagh, .	1
36,	Harry E. Lowe,	West Boylston, .	Harry E. Lowe, .	6
	W. P. Laughton, .	W. Bridgewater, .	O. Beimore,	5
114-3,	John H. Webb,	W. Brookfield, .	John H. Webb	6
35-11,	Chas. W. Barnes, .	West Newbury, .	Frank D. Bailey, .	3
6961-J and 1504	Elam B. Jones,	W. Springfield, .	George W. Hayden, .	6
8010,	B. P. Bissell,	W. Stockbridge, .		-
92-3,	Wm. J. Rotch,	West Tisbury, .	Jerry B. Mayhew, .	5

LIST OF FOREST WARDENS AND LOCAL MOTH SUPERINTENDENTS - Con.

TELEPHONE NUMBER.	Forest Warden.	Town or City.	Local Moth Superintendent.	Div No.
153-12,	T. W. Humphrey, .	Westborough, .	George E. Hayden, .	6
111-Y,	T. H. Mahoney,	Westfield,		-
44-11,	H. L. Nesmith,	Westford,	H. L. Nesmith, .	3
1482-2, East-	Myron L. Clapp, .	Westhampton, .		-
hampton.	W. F. Neal,	Westminster, .	G. A. Sargent,	6
1329-М,	B. R. Parker,	Weston,	E. P. Ripley,	2
41-21,	Frank Whalon,	Westport,	Christopher Borden/.	4
302-W, Dedham,	Elmer E. Smith, .	Westwood,	Martin Sorenson, .	4
185-M,	Walter W. Pratt, .	Weymouth, .	C. L. Merritt,	4
	Thos. J. Flynn,	Whately,	Rylan C. Howes, .	6
349-W,	C. A. Randall,	Whitman,	C. A. Randall,	5
1-4,	Henry I. Edson, .	Wilbraham, .	Henry I. Edson, .	6
8011-2,	John Brown,	Williamsburg, .		-
329-W,	Wm. H. Davies,	Williamstown, .	Wm. H. Davies, .	6
19-2,	Edwin L. Day,	Wilmington, .	Oliver McGrane, .	3
102-4,	Theron C. Flint, .	Winchendon, .	Waldo F. Streeter, .	6
4 and 39,	David H. DeCourcy, .	Winchester, .	S. S. Symmes,	3
202–12,	Amos S. Ferry,	Windsor,		-
		Winthrop,	Harry Hills,	1
	Frank E. Tracey, .	Woburn,	H. V. Macksey, .	3
7137, Park,	W. N. Avery,	Worcester,	Thos. E. Holland, .	6
10-22,	Chas. A. Kilbourn, .	Worthington, .		-
21-5 and 69,	Geo. H. E. Mayshaw, .	Wrentham,	H. Gilmore,	4
53-31,	J. W. Hamblin,	Yarmouth,	Sidney T. Holway,	5

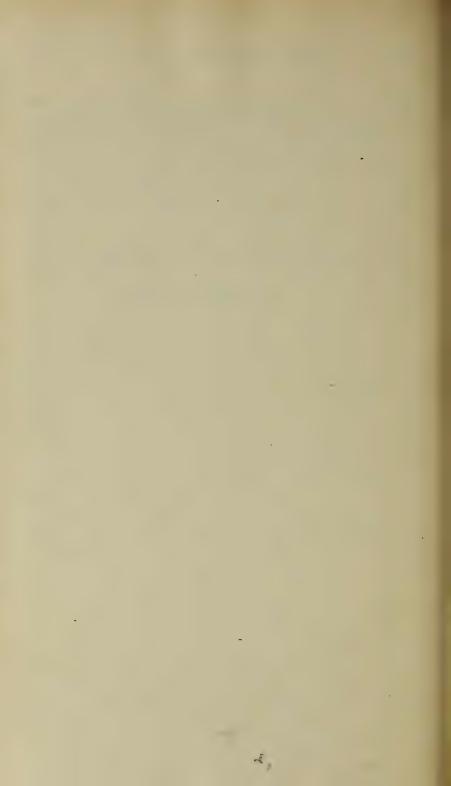
RECOMMENDATIONS.

- 1. That the present law governing the disposal of slash or brush needs revision in such a way as to place the responsibility for getting the results desired.
- 2. That there should be a law prescribing the manner of measuring wood when it is sold in short lengths other than 3 and 4 foot lengths, and sold as thrown wood (not piled) or cubic measure.
- 3. That provision be made through the enactment of law for extending financial aid to certain towns in the extinguishing of forest fires.

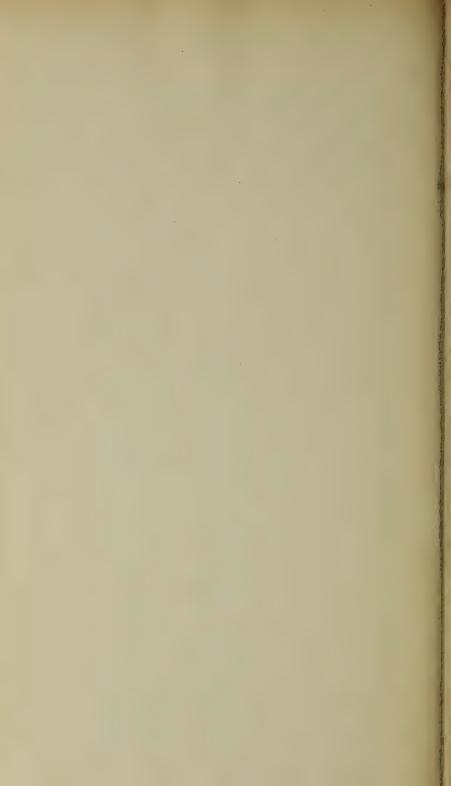
Respectfully submitted,

F. W. RANE,

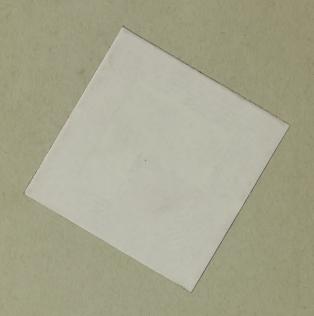
State Forester.











DEC 2 1925



